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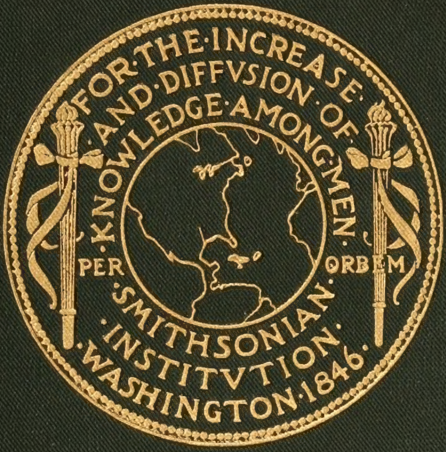
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UNITED STATES NATIONAL MUSEUM
Bulletin 111

A MONOGRAPH OF THE EAST AMERICAN SCAPHOPOD MOLLUSKS

BY

JOHN B. HENDERSON
Of Washington, District of Columbia

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The scientific publications of the United States National Museum consist of two series, the *Proceedings* and the *Bulletins*.

The *Proceedings*, the first volume of which was issued in 1878, are intended primarily as a medium for the publication of original, and usually brief, papers based on the collections of the National Museum, presenting newly acquired facts in zoology, geology, and anthropology, including descriptions of new forms of animals, and revisions of limited groups. One or two volumes are issued annually and distributed to libraries and scientific organizations. A limited number of copies of each paper, in pamphlet form, is distributed to specialists and others interested in the different subjects, as soon as printed. The dates of publication are recorded in the tables of contents of the volumes.

The *Bulletins*, the first of which was issued in 1875, consist of a series of separate publications comprising chiefly monographs of large zoological groups and other general systematic treatises (occasionally in several volumes), faunal works, reports of expeditions, and catalogues of type-specimens, special collections, etc. The majority of the volumes are octavos, but a quarto size has been adopted in a few instances in which large plates were regarded as indispensable.

Since 1902 a series of octavo volumes containing papers relating to the botanical collections of the Museum, and known as the *Contributions from the National Herbarium*, has been published as bulletins.

The present work forms No. 111, of the *Bulletin* series.

William deC. Ravenel,
Administrative Assistant to the Secretary,
in charge of the United States National Museum.

Washington. D. C., June 20, 1920.

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A MONOGRAPH OF THE EAST AMERICAN SCAPHOPOD MOLLUSKS.

By John B. Henderson,
Of Washington, District of Columbia.

INTRODUCTION.

During the latter part of the eighteenth and the first quarter of the nineteenth century many species of the abundant shallow water mollusks of the western Atlantic, especially of the larger and more conspicuous Antillean forms, were described by European naturalists. Between 1820 and 1840 several American naturalists, notably Conrad and Say, added a number of species to the American list, their material coming mostly from the Atlantic and Gulf coasts of the United States. At that time there had been little or no dredging done, nor, indeed, had any attempt been made at systematic, much less intensive, collecting. Only those easily acquired mollusks were known that lived either in the shallow water of bays or that had been cast upon exposed beaches. As the American Scaphopods live below tidal range and are rarely found upon beaches they almost wholly escaped the notice of the earlier collectors. A few Dentalia, probably from Antillean beaches, had, however, found place in foreign collections and were described in the careless manner of the time, usually with doubtful or no locality records attached. Such species were *Dentalium semistriatum* of Turton, published in 1819 as coming from Dublin Bay, and also *D. nebulosum* of Deshayes in 1825. In 1834 Guilding described *D. semistriolatum* and *D. sowerbyi* as positively Antillean species, and these stand as the first recorded of our Dentalia that may be accepted with reasonable assurance. Chenu, in the first volume of his imposing series of Illustrations Conchyliologiques, appearing about 1843, gives excellent figures of his own and of Deshayes's species of Dentalium, some of which may belong to the western Atlantic. These are *Dentalium nebulosum* Deshayes (already referred to), *D. translucidum* Chenu, *D. americanum* Chenu, *D. pictei* (Deshayes) Chenu, *D. ensiforme* Chenu, and a few others that are suspiciously like some well-known West Indian forms. There are good reasons, to be later discussed, for rejecting them all for our present list.

During the decade from 1840 to 1850 five undoubtedly valid American species were added to Guilding's accepted two. These were Orbigny's *D. antillarum*, *D. disparile*, and *D. dominguensis* (Cadulus) 1846, from Antillean shores, excellently figured in his report upon the mollusks in Sagra's Natural History of Cuba; Philippi's *D. texasianum* from Galveston, 1848, and Conrad's *D. eboreum*, 1846, from Tampa. These are all from definite localities, Philippi's specimens having been sent him by Roemer.

About this time (1840–1850) there was considerable activity among students of the molluscan fauna of New England. Gould published his Invertebrates of Massachusetts in 1841, in which he referred a New England *Dentalium* to the *Dentalium dentale* of Linnaeus, and two years later Mighels, in another list of New England shells, added *D. entale* of Linnaeus. Both these names were destined to be cast aside and restored many times by subsequent writers, who believed or not that these American shells were merely western examples of the European species of Linnaeus.

In 1850, then, there were eight positively known species of Scaphopods from the western Atlantic, two of which were regarded as identical with European forms. The following year, William Stimpson published his Shells of New England, in which he disposed of *D. dentale* Linnaeus as an American species, in favor of his own *D. occidentale*. The species already referred to by Mighels as *entale* Linnaeus he redescribed the same year as *D. striolatum*, as he doubted the identity of the American and the European shells.

From 1851 to 1879 there were no direct additions to the short American Scaphopod list. In 1860 Sowerby published a monograph of the Dentalia in his Thesaurus Conchyliorum. Among the new species therein described three are of interest to us, as having been accepted later on as identical with American forms. These are *D. filum*, *D. fistula*, and *Siphonodentalium lobatum*. In 1870 Jeffreys published *D. gracile* and in 1877, *Cadulus cylindratus*, and *D. ensiculus* (from European waters), species later considered as also American mollusks. All these six species are northeastern Atlantic.

The first large and important addition to our Scaphopod list came in 1879 as a result of the work of the *Challenger*. Doctor Boog-Watson published in that year in the Journal of the Linnean Society a preliminary descriptive list of Scaphopoda (among others) obtained by that famous expedition (1872–1876). All the new American species described therein were obtained from four *Challenger* stations only, located between Prince Edward Islands on the north and Fernando Noronha on the south, and in depth from 25 to 450 fathoms. In 1885 these various species were republished and figured in Watson's massive report upon the *Challenger* Scaphopods and Gasteropods. For care and fidelity in description and in the thoroughness of his methods Doctor Watson set an entirely new pace in systematic work. The additions to the western Atlantic Scaphopods therein made, including his own new species and those of others regarded by him as American as well as European, are as follows:

Dentalium capillosum Jeffreys (1876).
Dentalium entalis orthrum Watson.
Dentalium circumcinctum Watson.
Dentalium compressum Watson.
Dentalium subterfissum Jeffreys (1877).
Dentalium didymum Watson.
Dentalium ensiculus Jeffreys (1877).
Siphonodentalium platamodes Watson.
Siphonodentalium tytthum Watson.
Siphonodentalium tetraschistum Watson.
Cadulus vulpidens Watson.
Cadulus rastridens Watson.
Cadulus sauridens Watson.
Cadulus curtus Watson.
Cadulus curtus congruens Watson.
Cadulus curtus obesus Watson.
Cadulus exiguus Watson.
Cadulus ampullaceus Watson.

The *Challenger* was by no means the first to use the dredge in American waters. The United States Coast Survey steamers *Corwin* in 1867, the *Bibb* in 1868–9, the *Hassler* in 1871–2, the *Bache* in 1872, all made marine explorations with the dredge in connection with other oceanographic work in the Gulf of Mexico, the Straits of Florida, off Yucatan, in the Caribbean, and in the Atlantic off Brazil. The names of Count Pourtales, Louis Agassiz, and William Stimpson are connected with these vessels but the amount of Scaphopod material derived from their dredgings appears not to have been great. In the case of the *Bibb*, which, under the direction of Pourtales, worked in the exceedingly rich region off the Florida Keys, it is likely that a fine lot of mollusks would have been added to the Government collections had it not been for their destruction in the great Chicago fire while in the possession of William Stimpson, to whom they had been given for report.

It is to the Coast Survey steamer *Blake*, during her three cruises (1877–1880) in the Gulf of Mexico and Antillean waters, that are due the largest and most important additions to our knowledge of the American Scaphopoda. Under the able direction of Alexander Agassiz and the command of officers, who fortunately took a keen interest in the work, an exceptionally large amount of material was obtained from many stations and from depths ranging from a few fathoms to the ocean floor. Dr. William H. Dall, with his usual thoroughness, reported upon this great collection of mollusks in two Bulletins of the Museum of Comparative Zoology of the years 1881 and 1889. There appeared by far the most important as well as the most extensive addition to our Scaphopod list. Over 20 new species were described and figured. They are as follows:

Cadulus aequalis Dall, 1881.
Cadulus watsoni Dall, 1881.
Cadulus agassizii Dall, 1881.
Cadulus lunula Dall, 1881.
Cadulus cucurbitus Dall, 1881.
Cadulus quadridentatus Dall, 1881.
Cadulus poculum, 1889.
Cadulus carolinensis bushii Dall, 1889.
Cadulus amiantus Dall, 1889.
Cadulus acus Dall, 1889.
Cadulus minusculus Dall, 1889.
Dentalium perlongum Dall, 1881.
Dentalium sericatum Dall, 1881.
Dentalium ceratum Dall, 1881.
Dentalium sigsbeanum Dall, 1881.
Dentalium ophiodon Dall, 1881.
Dentalium callipeplum Dall, 1889.
Dentalium matara Dall, 1889.
Dentalium calamus Dall, 1889.
Dentalium taphrium Dall, 1889.
Dentalium carduus Dall, 1889.
Dentalium gouldii Dall, 1889.
Dentalium callithrix Dall, 1889.

Besides the above new forms almost all the American species thereto described were included in the reports for comment or discussion, and some foreign names were adopted for otherwise new American species.

Following the activities of the *Blake*, explorations were made by steamers of the United States Fish Commission in the deeper waters off the New England coast and off the Delaware Capes, extending their field of operations to the Hatteras region, from inshore stations to the abyssal depths beyond the continental slope. These were the *Fish Hawk* in 1880–1882, and the *Albatross* in 1883–4. The mollusks so obtained were made subjects of a series of papers by A. E. Verrill, published in the Transactions of the Connecticut Academy of Arts and Sciences in 1882, 1883, and 1885, and also by Katherine Bush in the same publication in 1885. The Verrill and Bush Scaphopods so added to our list are as follows:

1882.

Cadulus pandionis Verrill.

1884.

Dentalium solidum Verrill.
Dentalium occidentale sulcatum Verrill.
Cadulus grandis Verrill.

1885.

Dentalium laqueatum Verrill.
Dentalium leptum Bush.
Cadulus spectabilis Verrill.
Cadulus carolinensis Bush.
Cadulus incisus Bush.

To the above new species Verrill and Bush referred other American Scaphopoda to English and Norwegian species as follows:

Cadulus propinquus Sars.
Cadulus jeffreysii Monterosato.
Cadulus cylindratus Jeffreys.
Siphonodentalium lofotensis Sars.
Siphonodentalium affinis Sars.
Siphonodentalium vitrium Sars.
Siphonodentalium teres Jeffreys.
Dentalium ensiculus Jeffreys.

The *Albatross* also made some further explorations in the Gulf of Mexico and the Caribbean, and, finally, while leaving the Atlantic in 1887, established a series of stations along the South American coast. Doctor Dall published the results in 1892 in the Proceedings of the United States National Museum. This added to our already expanded list *Dentalium ceras* Watson, *D. candidum* Jeffreys, and *Cadulus tumidosus* Jeffreys.

No further additions were made until the appearance of Pilsbry and Sharp's monograph of the Scaphopoda in 1897-8, this being volume 17 of Tryon's Manual of Conchology. In this comprehensive work the authors carefully redefined all subgenera, grouped the species according to their affinities, made many useful keys, amplified many old descriptions, and illustrated anew many types in scales of large magnification. Although a monographic work upon the Scaphopoda of the world in general, it remains to-day, for our western Atlantic forms, the last and best word upon the subject. The following new species and subspecies to be included in our list where therein created:

Dentalium meridionale Pilsbry and Sharp.
Dentalium liodon Pilsbry and Sharp.
Dentalium liodon alloschismum Pilsbry and Sharp.
Dentalium pressum Pilsbry and Sharp (new name for *compressum* Watson).
Dentalium stenoschizum Pilsbry and Sharp.
Cadulus tetrodon Pilsbry and Sharp.
Cadulus hatterasensis Pilsbry and Sharp.
Cadulus rushii Pilsbry and Sharp.

The collection in the United States National Museum of the Scaphopods of the Western Atlantic is made up of the type lot material from the various United States governmental collecting sources heretofore mentioned, together with some material obtained by exchange or gift. Such was the collection in 1898 when consulted by Doctor Pilsbry in the preparation of his monographic work. During the past 20 years the museum collection has been greatly augmented. Many specimens have been culled from hitherto unsifted lots of *Albatross* material dredged in the Gulf and Caribbean in 1885 and 1886. Other lots have been received from shallow-water Antillean stations obtained by numerous collectors. Much material has also been received from the Bureau of Fisheries Station at Beaufort, North Carolina, collected by the *Fish Hawk* during the last few years in the region about Cape Lookout. Several hundred lots of Scaphopods have been added to the collection during the last five years from my own dredgings in the yacht *Eolis*, operating in the Florida Keys region from Tortugas to Miami and in the Bahamas in depths from the shore to about 200 fathoms. Much interesting material has also been received from the *Tomas Barrera* expedition to western Cuba, furnishing probably a very complete series of the shallow-water forms of Cuba. Finally, a share of the material taken by the State University of Iowa Expedition to the Barbados in 1918 has been added to the national collection.

It was the attempt to identify and classify this 20 years' accumulation of new material that led to a review of the whole collection, which, in turn, furnishes the subject matter of this paper. The following new species and subspecies are herein described:

Dentalium laqueatum regulare.
Dentalium texasianum cestum.
Dentalium texasianum rioense.
Dentalium gouldii portoricense.
Dentalium gouldii colonense.
Dentalium rebeccaense.
Dentalium entale stimpsoni.
Dentalium agile subagile.
Dentalium occidentale georgiense.
Dentalium ceratum flavum.
Dentalium ceratum tenax.
Dentalium bartletti.
Dentalium tubulatum.
Dentalium meridionale jamaicense
Dentalium meridionale verrilli.
Dentalium floridense.
Dentalium amaliense.
Dentalium sowerbyi pelliceri.
Entalina quadrata.
Siphonodentalium striatinum.
Siphonodentalium verrilli.
Siphonodentalium occidentale.
Siphonodentalium bushi.
Cadulus quadridentatus acompsus.
Cadulus elephas.
Cadulus catharus.
Cadulus parvus.
Cadulus foweyensis.
Cadulus portoricensis.
Cadulus rushi arne.
Cadulus providensis.
Cadulus elongatus.
Cadulus greenlawi.
Cadulus arctus.
Cadulus braziliensis.
Cadulus simpsoni.
Cadulus nitidus.
Cadulus miamiensis.
Cadulus mayori.
Cadulus iota.
Cadulus subula.
Cadulus verrilli.
Cadulus regularis.
Cadulus atlanticus.
Cadulus transitorius.
Cadulus transitorius barbadensis.
Cadulus platensis.
Cadulus podagrinus.
Cadulus halius.
Cadulus tersus.

Before proceeding to the consideration of the genera and species I wish to make grateful acknowledgment to the officials of the United States National Museum for the privilege accorded me to consult and freely to use the great collection of *Scaphopods* in their care, and for their courtesy and invaluable aid rendered me in the preparation of this paper.

I am also greatly indebted to Dr. Henry A. Pilsbry, curator of the conchological section of the Philadelphia Academy of Sciences, for the generous loan of the Academy collection of *Dentalia* and *Caduli*, and I am equally indebted to Mr. William F. Clapp, in charge of the collection of mollusks in the Museum of Comparative Zoology in Cambridge, Massachusetts, for his courtesy in sending me all the American Scaphopods of that collection.

CLASSIFICATION OF THE SCAPHOPODA.

The class Scaphopoda includes but two families—the Dentaliidae and the Siphonodentaliidae. The distinctions between them are based upon (*a*) differences in the median tooth of the radula, (*b*) the form of the foot, (*c*) certain quite definite shell characters.[1]

The Dentaliidae has the median tooth of the radula twice as wide as long; a pointed conical foot surrounded by an epipodial process resembling a wingshaped sheath, which is interrupted or slit, like the break in a fold, on one side; a shell with greatest diameter at aperture. The shell is almost always, to some extent at least, sculptured.

The Siphonodentaliidae has the median tooth of the radula less than double its length. The foot lacks any epipodial processes, and is either a slender vermiform organ or is expanded on the end into a symmetrical disk with fluted or indented border. The shell, except in one restricted group, wholly lacks sculptural features, being smooth and glassy in texture, and it is generally contracted at the aperture.

Family DENTALIIDAE.

The family Dentaliidae possesses but one genus—*Dentalium*. This has been subdivided into a number of subgenera based chiefly upon apical characters of the shell. The actual value of these apical characters for the purpose of classification, and therefore the value of subgenera chiefly based upon them, is not altogether assured, but in a genus embracing so many species some form of division is useful, even though it be somewhat artificial. Any one character, if relied upon to distinguish the larger groups, answers well enough for a time, but it always seems eventually to invite trouble. The shell characters that may be used better in combination for the larger or the smaller groups are: Type of sculpture, the form of the tip, the degree of curvature, the size and thickness of the shell, the position and form of the apical slit.[2]

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[1] For detailed study of the anatomy of the Scaphopoda see Lacaze-Duthiers, Historie de l'orginisation et du developpement du Dentale. Ann. des Sci. Nat. (Zool.), vol. 4, pp. vi, vii, (1856–7); Simroth, Bronn's Klassen und Ordnungen des Thier-Reichs (new ed.), vol. 3, pp. 356–467, (1895); Lang, Text Book of Comp. Anatomy (English translation by Bernard), Part 2 (1896) (see index for many references); Pilsbry and Sharp, Tryon's Manual of Conchology, vol. 17 (1897–8) (see pp. xi–xiv for references to literature); Pelseneer, Mollusca, vol. 5 of Treaties on Zoology (Lankester), pp. 197–204 (1906) (see bibliography on page 204). The earlier researches of Deshayes, Sars, and others are fully reviewed in the works mentioned.

[2] For discussion of the relative values of subgeneric characters in the Scaphopoda see Pilsbry and Sharp in Tryon's Manual of Conchology, vol. 17, p. ix of the introduction, also p. xxix. See also Dall in Transactions of the Wagner Institute, vol. 3, part 2, p. 435.

Genus DENTALIUM Linnaeus, 1758.

1758. *Dentalium* Linnaeus, Syst. Nat., ed. 10, p. 785.

Type.—D. elephantinum Linnaeus (Amboyna).

Shell an elongate tube open at both ends, increasing in diameter from the apex to the aperture, the section of maximum diameter being coincident with the peristome; almost straight to strongly curved; usually sculptured with longitudinal (lengthwise as from tip to aperture) riblets or engraved lines, especially near the tip or on the posterior portion. The sculptural features may vary in degree from faint indications to strong heavy ribs, and these may vary in number from 6 to 60 or more. The original number of ribs or riblets in the apical portion are often increased later by the addition of others intercalated between them, so that as the animal grows its shell increases in the number of its ribs. Frequently all sculptural features present in the posterior or middle portion of the shell disappear in the anterior portion, the senile stage showing a smooth surface. The sculpture is sometimes further modified by fine transverse lirae occupying the spaces between the longitudinal ribs or even crossing them. Again, the intercostal surface may present a fine reticulated plan of excessively minute sculptural elements. In some groups there are no sculptural features whatever. The embryonic portion of the apex is very minute and fragile, and is always lost, save rarely, in very young specimens. The apical section remaining may be round or angular in section, in which latter case the angles become the beginnings of the primary ribs or riblets. The apical opening is usually modified by a slit or notch of varying width or depth and variously placed in different groups; or the opening may be simple without either notch or slit. The shell varies in size from minute needle-like forms to those of 4 or 5 inches in length, in thickness from fragile to heavy and solid; in texture from soft and chalky to hard porcellanous or glassy; in color from occasional greenish, reddish, or yellowish species to pure white, the latter greatly predominating. The shells may be transparent, translucent to opaque, dull lusterless to the most highly polished and glistening surface.

The animal is shaped like the shell it occupies—elongate, wrapped in a mantle open at both ends. From the larger end a pointed cylindrical foot may be protruded or almost wholly withdrawn. It is capable of more or less expansion at the end. There are no tentacles or eyes. Just back of the mouth is a cluster of thread-like appendages enlarged into spoon-shaped terminals (captaculae). The exact function of these seems not to be definitely understood, but they are supposed to catch and hold the food, consisting largely of foraminifera and other minute organisms. The liver is two-lobed, the gonad simple; the heart consists of one ventricle, and there are no gills. The excretory openings are in the forward part of the mantle cavity, but the escape of fecal and of sexual products is through the smaller end of the shell. The sexes are distinct. The nervous system consists of symmetrically placed central, pleural, pedal, visceral, and buccal ganglia.

The subgenera of *Dentalium* under which the species of the western Atlantic fall are: *Dentalium* (s. s.), *Antalis*, *Heteroschisma*, *Fissidentalium*, *Graptacme*, *Laevidentalium*, *Episiphon*, *Bathoxiphus*, *Compressidens*, and *Fustiaria*. These will be more particularly discussed under the separate headings for each group, but for a more immediate and general acquaintance the following synopsis of characters is presented. The distinctions can not be sharply drawn, and some species listed under one heading may partake more or less of the characters of some other group.

SYNOPSIS OF THE SUBGENERA OF DENTALIUM.

- Tip: Angled, polygonal in section.
  - Sculpture: Primary ribs prominent; 6, 9, 10, or 12 primary ribs in American forms.
    - Apical features: A notch or shallow slit on the convex side, or apparently wanting
      - Size: Medium to large.............................*Dentalium*, page 22.
- Tip: Less distinctly polygonal, "sometimes round."
  - Sculpture: Riblets 6 to 18, sometimes almost obsolete.
    - Apical features: Notch (not slit) on convex side or absent.
      - Size: Medium or very long and slender...............*Antalis*, page 34.
- Tip: Polygonal, American forms, with 9-angled section.
  - Sculpture: Coarse riblets, but not strongly ribbed.
    - Apical features: Slit on concave side.
      - Size: Medium to large.........................*Heteroschisma*, page 56.
- Tip: Indistinctly polygonal, hexagonal.
  - Sculpture: Very many riblets.
    - Apical features: Long, narrow slit on convex side.
      - Size: Very large...........................*Fissidentalium*, page 58.
- Tip: Round.
  - Sculpture: None.
    - Apical features: Apical slit generally on convex side or sometimes laterally placed.
      - Size: Small...................................*Graptacme*, page 65.
- Tip: Round.
  - Sculpture: None.
    - Apical features: Apical slit generally on convex side.
      - Size: Small or long and slender..............*Laevidentalium*, page 73.
- Tip: Round.
  - Sculpture: None.
    - Apical features: No slit, usually a projecting "pipe."
      - Size: Very small, needle-like.......................*Episiphon*, page 77.
- Tip: Unknown.
  - Sculpture: None.
    - Apical features: Broad slit on convex side.
      - Special features: Strongly compressed laterally.
        Bathoxiphus, page 81.

Tip: Unknown.
  Sculpture: None.
    Apical features: None.
      Size: Small.
        Special features: Strongly compressed between convex and concave sides .... *Compressidens*, page 83.

Tip: Unknown.
  Sculpture: None.
    Apical features: Very long, straight, linear slit on or near the convex side.
      Size: Medium .... *Fustiaria*, page 86.

Family SIPHONODENTALIIDAE.

This, the second family of the Scaphopoda (see p. 87 for the essential features), contains the three genera, *Entalina, Siphonodentalium,* and *Cadulus.* These may be roughly diagnosed as to shell characters in synoptical form, as follows:

Form: Greatest diameter at aperture, strongly curved.
  Apical features: Nuclear apex round in section, becoming hexagonal.
    Sculpture: Very fine longitudinal riblets.
      Size: Small .... *Entalina*, page 87.

Form: Greatest diameter at aperture, strongly curved.
  Apical features: Apex round in section.
    Sculpture: None; highly polished surface.
      Size: Small .... *Siphonodentalium*, page 88.

Form: Greatest diameter not at the aperture.
  Apical features: None.
    Sculpture: None.
      Size: Small .... *Cadulus*, page 95.

Genus ENTALINA Monterosato, 1872.

1872. *Entalina* MONTEROSATO, Notizia intorno alle Conch. Foss. di Monte Pellegrino e Ficarazzi, p. 27.

Type.—*E. tetragona* Brocchi (Italian fossil).

Shell *Dentalium*-like in having the greatest diameter at the aperture. Very strongly curved, small, and sculptured with longitudinal fine riblets. The apex (except in the nuclear portion) is angular; in the two American species quadrate. The angled apex and sculptural features suggest a true *Dentalium*, but the form of the foot and other anatomical features indicate a position under the Siphonodentaliidae.

This genus needs no further subdivision.

Genus SIPHONODENTALIUM Sars, 1859.

1859. *Siphonodentalium* SARS, Forh. Videnskabs-Selskabet, Christiania, p. 52.

Type.—*S. vitreum* Sars (north Europe).

Shell strongly arcuate, slightly tapering with maximum diameter at aperture. Circular in section and without sculpture. Apex large and either simple or cut into lobes.

The genus has been divided into two "sections," according to the presence or absence of apical lobes, but the value of the subdivisions may be questioned. They are:

Apex with slits or lobes........................... *Siphonodentalium* s. s., page 88.
Apex simple.. *Pulsellum*, page 92.

Genus CADULUS Philippi, 1844.

1844. *Cadulus* Philippi, Enum. Moll. Sicil., vol. 2, p. 209.

Type.—C. ovulum Philippi. (Mediterranean.)

Shell scupltureless, smooth, polished, of circular or oval section. More or less arcuate, with a greater or lesser swelling or bulge near the middle or between the median portion and the aperture. Aperture usually somewhat contracted and never the section of greatest diameter of the shell. Apical characters vary from simple to two or four deeply or slightly cut notches.

The division of *Cadulus* into subgenera of doubtful value finds an excuse only in the aid it offers in grouping conveniently a large number of species of slight diagnostic features. Possibly the value of *Polyschides* from a biologic point of view may be less questioned as a subgenus distinct from what is accepted as typical *Cadulus*, but the others are rather artificial. The following is the order of subdivision offered by Pilsbry and Sharp with the addition of *Platyschides:*

Apex with two prominent slits.. *Dischides*.
Apex with four prominent slits leaving four prominent triangular lobes,
Polyschides, page 96.
Apex with four very shallow notches leaving four wide lobes..... *Platyschides*, page 104.
Apex not slit or notched.
  Small obese forms.. *Cadulus* s. s., page 141.
  Slender forms... *Gadila*, page 130.

The subgenus *Dischides* characterized by two slits in the apex is as yet unknown from the faunal areas under consideration.

LIST OF THE EAST AMERICAN SCAPHOPODS.

Dentalium (Dentalium) laqueatum Verrill 1885, page 23.
Dentalium (Dentalium) laqueatum laqueatum Verrill 1885, page 24.
Dentalium (Dentalium) regulare, new subspecies, page 26.
Group of *D. texasianum:*
  Dentalium (Dentalium) texasianum Philippi 1848, page 27.
  Dentalium (Dentalium) texasianum texasianum Philippi 1848, page 28.
  Dentalium (Dentalium) texasianum cestum, new subspecies, page 29.
  Dentalium (Dentalium) texasianum rioense, new subspecies, page 29.
  Dentalium (Dentalium) gouldii Dall, 1889, page 29.
  Dentalium (Dentalium) gouldii gouldii Dall, 1889, page 30.
  Dentalium (Dentalium) gouldii portoricense, new subspecies, page 30.
  Dentalium (Dentalium) gouldii colonense, new subspecies, page 31.
  Dentalium (Dentalium) rebeccaense, new species, page 31.
  Dentalium (Dentalium) obscurum Dall, 1890, page 32.
  Dentalium (Dentalium) carduus Dall 1889, page 33

Group of *D. occidentale:*
- *Dentalium* (*Antalis*) *entale stimpsoni*, new name, page 35.
- *Dentalium* (*Antalis*) *agile subagile*, new subspecies, page 38.
- *Dentalium* (*Antalis*) *occidentale* Stimpson, 1851, page 40.
- *Dentalium* (*Antalis*) *occidentale occidentale* Stimpson, 1851, page 41.
- *Dentalium* (*Antalis*) *occidentale georgiense*, new name, page 43.

Group of *D. antillarum:*
- *Dentalium* (*Antalis*) *antillarum* Orbigny 1846, page 44.
- *Dentalium* (*Antalis*) *pseudohexagonum* Ihering, page 46.
- *Dentalium* (*Antalis*) *disparile* Orbigny, 1846, page 47.

Group of *D. ceratum:*
- *Dentalium* (*Antalis*) *ceratum* Dall, 1881, page 49.
- *Dentalium* (*Antalis*) *ceratum ceratum* Dall, 1881, page 50.
- *Dentalium* (*Antalis*) *ceratum flavum*, new subspecies, page 51.
- *Dentalium* (*Antalis*) *tenax*, new subspecies, page 52.
- *Dentalium* (*Antalis*) *taphrium* Dall, 1889, page 53.

Group of *D. bartletti:*
- *Dentalium* (*Antalis*) *bartletti*, new species, page 55.
- *Dentalium* (*Antalis*) *tubulatum*, new species, page 56.

Dentalium (*Heteroschisma*) *callithrix* Dall, 1889, page 57.
Dentalium (*Heteroschisma*) *subterfissum* Jeffreys, 1877, page 58.
Dentalium (*Fissidentalium*) *amphialum* Watson, 1879, page 59.
Dentalium (*Fissidentalium*) *meridionale* Pilsbry and Sharp, 1897, page 59.
Dentalium (*Fissidentalium*) *meridionale meridionale* Pilsbry and Sharp, 1897, page 61.
Dentalium (*Fissidentalium*) *meridionale jamaicense*, new subspecies, page 62.
Dentalium (*Fissidentalium*) *meridionale verrilli*, new name, page 62.
Dentalium (*Fissidentalium*) *floridense*, new species, page 64.
Dentalium (*Graptacme*) *eboreum* Conrad, 1846, page 66.
Dentalium (*Graptacme*) *circumcinctum* Watson, 1879, page 68.
Dentalium (*Graptacme*) *semistriolatum* Guilding, 1834, page 69.
Dentalium (*Graptacme*) *amaliense*, new species, page 71.
Dentalium (*Graptacme*) *sericatum* Dall, 1881, page 71.
Dentalium (*Graptacme*) *calamus* Dall, 1889, page 72.
Dentalium (*Laevidentalium*) *callipeplum* Dall, 1889, page 74.
Dentalium (*Laevidentalium*) *perlongum* Dall, 1881, page 75.
Dentalium (*Laevidentalium*) *liodon* Pilsbry and Sharp, 1897, page 76.
Dentalium (*Laevidentalium*) *liodon liodon* Pilsbry and Sharp, 1897, page 76.
Dentalium (*Laevidentalium*) *liodon alloschismum* Pilsbry and Sharp, 1897, page 77
Dentalium (*Episiphon*) *sowerbyi* Guilding, 1834, page 77.
Dentalium (*Episiphon*) *sowerbyi sowerbyi* Guilding, 1834, page 79.
Dentalium (*Episiphon*) *sowerbyi pelliceri*, new subspecies, page 80.
Dentalium (*Bathoxiphus*) *ensiculus* Jeffreys, 1877, page 81.
Dentalium (*Bathoxiphus*) *didymum* Watson, 1879, page 83.
Dentalium (*Compressidens*) *pressum* Pilsbry and Sharp, 1897, page 83.
Dentalium (*Compressidens*) *ophiodon* Dall, 1881, page 84.
Dentalium (*Fustiaria*) *stenoschisum* Pilsbry and Sharp, 1897, page 86.
Entalina platamodes Watson, 1879, page 87.
Entalina quadrata, new species, page 88.
Siphonodentalium lobatum Sowerby, 1860, page 89.
Siphonodentalium striatinum new species, page 90.
Siphonodentalium tytthum Watson, 1879, page 91.
Siphonodentalium verrilli, new species, page 91.
Siphonodentalium (*Pulsellum*) *occidentale*, new species, page 93.
Siphonodentalium (*Pulsellum*) *bushi*, new species, page 94.
Cadulus (*Polyschides*) *tetraschistus* Watson, 1879, page 97.
Cadulus (*Polyschides*) *quadridentatus* Dall 1881, page 97.

Cadulus (*Polyschides*) *quadridentatus quadridentatus* Dall 1881, page 99.
Cadulus (*Polyschides*) *quadridentatus acompsus*, new subspecies, page 100.
Cadulus (*Polyschides*) *tetrodon* Pilsbry and Sharp, 1897, page 101.
Cadulus (*Polyschides*) *carolinensis* Bush, 1885, page 102.
Group of *C. grandis:*
    Cadulus (*Platyschides*) *grandis* Verrill, 1884, page 105.
    Cadulus (*Platyschides*) *spectabilis* Verrill, 1885, page 106.
    Cadulus (*Platyschides*) *elephas*, new species, page 107.
    Cadulus (*Platyschides*) *poculum* Dall, 1889, page 108.
    Cadulus (*Platyschides*) *aequalis* Dall, 1881, page 109.
Group of *C. agassizi:*
    Cadulus (*Platyschides*) *agassizii* Dall 1881, page 110.
    Cadulus (*Platyschides*) *catharus*, new species, page 112.
    Cadulus (*Platyschides*) *parvus*, new species, page 113.
    Cadulus (*Platyschides*) *foweyensis*, new species, page 114.
    Cadulus (*Platyschides*) *portoricensis*, new species, page 115.
Group of *C. pandionis:*
    Cadulus (*Platyschides*) *rushii* Pilsbry and Sharp, 1898, page 116.
    Cadulus (*Platyschides*) *rushii arne*, new subspecies, page 118.
    Cadulus (*Platyschides*) *pandionis* Verrill and Smith, 1880, page 118.
    Cadulus (*Platyschides*) *watsoni* Dall, 1881, page 120.
Cadulus (*Platyschides*) *vulpidens* Watson, 1879, page 121.
Cadulus Platyschides) *providensis*, new species, page 122.
Cadulus (*Platyschides*) *elongatus*, new species, page 122
Cadulus (*Platyschides*) *greenlawi*, new species, page 123
Cadulus (*Platyschides*) *arctus*, new species, page 124.
Cadulus (*Platyschides*) *braziliensis*, new species, page 124
Cadulus (*Platyschides*) *bushii* Dall, 1889, page 125.
Cadulus (*Platyschides*) *lunula* Dall, 1881, page 126.
Cadulus (*Platyschides*) *simpsoni*, new species, page 127.
Cadulus (*Platyschides*) *amiantus* Dall, 1881, page 128.
Cadulus (*Platyschides*) *nitidus*, new species, page 129.
Cadulus (*Platyschides*) *miamiensis*, new species, page 129.
Group of *C. sauridens:*
    Cadulus (*Gadila*) *sauridens* Watson, 1879, page 131.
    Cadulus (*Gadila*) *rastridens* Watson, 1879, page 132.
    Cadulus (*Gadila*) *mayori*, new species, page 133.
Group of *C. minusculus:*
    Cadulus (*Gadila*) *minusculus* Dall, 1889, page 134.
    Cadulus (*Gadila*) *iota*, new species, page, 134.
    Cadulus (*Gadila*) *subula* new species, page 135.
    Cadulus (*Gadila*) *verrilli*, new species, page 136.
    Cadulus (*Gadila*) *regularis*, new species, page 137.
    Cadulus (*Gadila*) *atlanticus*, new species, page 137.
Cadulus (*Gadila*) *cylindratus* Jeffreys, 1877, page 139.
Group of *C. acus:*
    Cadulus (*Gadila*) *acus* Dall, 1889, page 140.
    Cadulus (*Gadila*) *dominguensis* Orbigny, 1853, page 141.
Cadulus (*Cadulus*) *curtus* Watson, 1879, page 142.
Cadulus (*Cadulus*) *congruens* Watson, 1879, page 142.
Cadulus (*Cadulus*) *transitorius*, new species, page 143.
Cadulus (*Cadulus*) *transitorius barbadensis*, new subspecies, page 144.
Cadulus (*Cadulus*) *ampullaceus* Watson, 1879, page 144.
Cadulus (*Cadulus*) *exiguus* Watson, 1879, page 145.
Cadulus (*Cadulus*) *obesus* Watson, 1879, page 146.
Cadulus (*Cadulus*) *cucurbitus* Dall, 1881, page 146.

Cadulus (*Cadulus*) *platensis*, new species, page 147.
Cadulus (*Cadulus*) *podagrinus*, new species, page 148.
Cadulus (*Cadulus*) *halius*, new species, page 149.
Cadulus (*Cadulus*) *tersus*, new species, page 149.

GEOGRAPHICAL DISTRIBUTION.

The following table sets forth the geographical and depth ranges of all the species and subspecies enumerated in this paper. To interpret the records some allowance must be made for the meager information we possess in regard to many of the species. The area under consideration is very great, including many thousand miles of coast line and vast expanse of ocean, where the extremes of temperature and salinity are met. In all this diversified area but few rather restricted regions have been thoroughly explored. The entire coast from the Mississippi Delta to Colon and thence along the Caribbean shores of South America is almost unknown. The few records we have from its continental slope are insufficient for conclusive generalization. The number of dredge hauls from the entire South American coast is actually less than those made within a square of 20 or 30 miles off Cape Hatteras. The same is almost true of the archibenthal belt about the Antillean Islands. In the very few areas where intensive collecting has been done a number of Scaphopods have been discovered which, upon our range list, must appear to be as of a particular locality only, while some others connect specifically a thousand miles away without any intermediate record. Thus many vagaries of distribution are presented which would likely be explained away by a fuller knowledge of actual facts. Our table is truthful as far as it goes, but it can not always tell the whole truth.

A possible source of error may arise where the continental slope drops swiftly into profound depths, and especially where such declivities are swept by an oceanic current. This condition obtains off the Yucatan Banks, along the shores of Cuba, and probably in many other Antillean localities where steep depth gradients are the rule rather than the exception. Thus, species living near the upper edge of a continental slope (usually a rich life zone) may easily have their dead shells carried the few miles necessary to deposit them upon the ocean floor. Fish no doubt consume vast quantities of Scaphapods and occasionally eject their shells at considerable distances.

Despite the poverty of our data and the margin of error in our records it is, nevertheless, possible to draw some definite conclusions from the table.

1. A cold-water group (*D. stimpsoni*, *occidentale*, *georgiense*, *ensiculus*, and *S. lobatum*) belonging to a far northern range and all having East Atlantic affiliations, persist south of Cape Cod and occasionally even to Hatteras. In all such cases their station depths are sufficient to furnish the degree of cold necessary for their economy.

2. Of southern shallow and moderate depth forms but one (*C. agassizii*) passes Hatteras, and this along the Gulf Stream edge.

3. Many deep-water species have a very extensive southern range, but even in their cases Hatteras seems to form a recognizable barrier against northern migration. An exception is noted in *D. meridionale*, which, considered as a superspecies, extends from Brazil to Georges Banks, but in a least recorded depth of about 700 fathoms.

4. The majority of species enumerated belong to what might be called in broad terms an Antillean fauna. They are usually noted from more than one Antillean locality, and a large proportion of them appear along the Florida keys and the sweep of the Gulf Stream. Those Antillean species *not* found in the Florida Straits are of very restricted local distribution or belong to the greater depth zones.

5. A certain number of Florida Key species are not of Antillean range, but appear occasionally in the Gulf of Mexico and have a range northerly within the Gulf Stream influence to Hatteras. These seem to constitute a more strictly Floridian element.

6. A few species (*D. texasianum*, *pseudohexagonum*, *disparile*, *sericatum*, *liodon*, *C. acompsus*, *watsoni*, and *providensis*) seem to indicate a scheme of distribution which includes the mainland coast from Brazil to West Florida and the Carolinas, and excludes all the Antilles save Barbados; nor are they to be found in the Gulf Stream. Just how far such a faunal element may be differentiated is now unsafe to say in view of our imperfect knowledge of the area involved. There is a significance, however, in the present record, for it will also be noted that all our Brazilian records are only repeated in the Barbadian region, along the mainland shores and in the Gulf of Mexico, but not in the broad Antillean region, nor in the Gulf Stream. I exclude from these only the abyssal ocean floor species.

7. A false note is touched in an 11-fathom station off Rio de la Plata quoted four times in our table, and in each instance for deep-water species of other stations. I feel quite sure that some error has been made in recording this station (No. 2714) by the United States Fish Commission.

In conclusion, then, I would say we have to deal with two well-defined and clearly marked faunas—first, a northern cold-water group of close northern Europe affiliations, and extending from the New England region and its outer banks to Hatteras; second, an Antillean assemblage of very extensive range from Brazil to Hatteras, with the dominating influence of the currents entering the Caribbean from the Atlantic and debouching from the Gulf as the Gulf Stream as the main distributional force. Within this great area are likely certain well-marked subfaunal areas, two of which are recognizable from our table. One of these is a mainland coastal faunula and the other a Floridian element which includes the area bordering the inner edge of the Gulf Stream from lower Florida to Cape Lookout or Hatteras.

TABLE SHOWING HORIZONTAL AND

Name.	North Europe.	Arctic-Nova Scotia.	Maine-Cape Cod.	Outer N. Eng. Banks.	So. N. Eng., N. J., Md., Va.	Hatteras.	N. Car., S. Car., Ga.	Florida E. Coast.	Florida Keys.	Florida W. Coast.	Texas-Mexico.
D. laqueatum laqueatum						$\frac{49}{124}$			$\frac{24}{193}$	$\frac{60}{68}$	
D. l. regulare											
D. texasianum texasianum							$\frac{3}{9}$			*	*
D. t. cestum											*
D. t. rioense											
D. gouldii gouldii							12				
D. gouldii portoricense											
D. gouldii colonense											
D. rebeccaense										$\frac{7}{16}$	
D. obscurum											
D. carduus											
D. entale stimpsoni		$\frac{26}{150}$	$\frac{8}{106}$	$\frac{60}{1255}$	$\frac{41}{568}$	142					
D. agile subagile		$\frac{93}{134}$		57							
D. occidentale		$\frac{101}{103}$	$\frac{60}{175}$	$\frac{105}{1356}$	$\frac{26}{1061}$	$\frac{142}{843}$					
D. o. georgiense				1,255	$\frac{67}{1004}$	300					
D. antillarum									$\frac{2}{38}$	$\frac{2}{14}$	
D. pseudohexagonum										$\frac{2}{5}$	
D. disparile										*	
D. ceratum ceratum								294	$\frac{35}{90}$	$\frac{60}{321}$	
D. c. flavum									$\frac{22}{135}$		
D. c. tenax											
D. taphrium						22	$\frac{22}{52}$		$\frac{8}{60}$	30	
D. bartletti							(?)		$\frac{85}{193}$	$\frac{196}{539}$	
D. tubulatum								294			
D. callithrix							731			1,181	
D. amphialum											
D. meridionale meridionale											
D. mer. jamaicense											
D. mer. verrilli				$\frac{852}{1813}$	$\frac{705}{1537}$	$\frac{885}{938}$					
D. floridense									$\frac{35}{110}$		
D. eboreum						$\frac{7}{87}$	$\frac{3}{52}$		$\frac{18}{60}$	$\frac{2}{111}$	
D. circumcinctum											
D. semistriolatum									$\frac{15}{90}$	$\frac{7}{12}$	
D. amaliense											
D. sericatum											
D. calamus									$\frac{1}{25}$		
D. callipeplum										$\frac{111}{169}$	

BATHYMETRIC DISTRIBUTION.

Yucatan Banks.	Caribbean mainland.	Bermuda.	Bahamas.	Cuba.	Jamaica.	Haiti-Santo Dom.	Porto Rico-St. Thos.	Lesser Antilles.	Barbados.	Brazil—North.	Brazil—South.	Fernando Noronha.	Argentine.
				$\frac{119}{182}$			*	$\frac{54}{154}$	100				
					*			120	$\frac{73}{140}$				
	*												
											59		
							20						
	25												
									$\frac{82}{140}$				
			338					$\frac{116}{154}$	100				
			$\frac{0}{20}$	$\frac{1}{12}$				*					
										*			
	*							*		*	*		
84				$\frac{200}{400}$			97	120	$\frac{60}{100}$				
				25									
									$\frac{33}{199}$				
399				400				$\frac{357}{464}$					
				220									
				224				$\frac{880}{1591}$	671				(?)
													1, 900
1, 568											671		
					966					1, 019			
									100				
						16	*	$\frac{3}{5}$					
		1, 075						470		350			
		*	20	*		*	*	*	*				
							*						
640													
			$\frac{1}{3}$	$\frac{0}{6}$			12						
							25	$\frac{61}{116}$					

TABLE SHOWING HORIZONTAL AND

Name.	North Europe.	Arctic-Nova Scotia.	Maine-Cape Cod.	Outer N. Eng. Banks.	So. N. Eng., N. J., Md., Va.	Hatteras.	N. Car., S. Car., Ga.	Florida E. Coast.	Florida Keys.	Florida W. Coast.	Texas-Mexico.
D. perlongum						683				$\frac{940}{1181}$	
D. liodon liodon											
D. l. alloschismum											
D. sowerbyi sowerbyi						$\frac{49}{124}$	17		$\frac{8}{250}$	$\frac{26}{60}$	
D. s. pelliceri									65		
D. ensiculus				1,813	$\frac{1631}{1859}$			294	193	196	
D. didymum											
D. pressum								294	$\frac{100}{339}$		
D. ophiodon								294	$\frac{75}{100}$	169	
D. stenoschizum									110		
E. platamodes								294	430		
E. quadrata											
S. lobatum	*	*	60		$\frac{100}{1813}$	516					
S. striatinum								294			
S. tytthum											
S. verilli				$\frac{384}{1290}$							
S. occidentale					$\frac{86}{984}$						
S. bushi				499	$\frac{319}{984}$	516					
C. tetraschistus											
C. quadridentatus						$\frac{15}{22}$	$\frac{17}{52}$		$\frac{3}{50}$	$\frac{10}{26}$	
C. q. acompsus											
C. tetrodon							12		$\frac{2}{38}$		
C. carolinensis						$\frac{7}{63}$	$\frac{3}{52}$		$\frac{38}{60}$	$\frac{10}{30}$	
C. grandis				$\frac{906}{1290}$	$\frac{705}{1537}$	$\frac{843}{928}$					
C. spectabilis					$\frac{1467}{1859}$						
C. elephas											
C. poculum											
C. aequalis									339		
C. agassizii					70	$\frac{63}{124}$	$\frac{17}{159}$		$\frac{20}{217}$		
C. catharus											
C. parvus									$\frac{43}{90}$		
C. foweyensis									$\frac{55}{90}$		
C. portoricensis											
C. rushii				$\frac{328}{662}$	$\frac{238}{1537}$	$\frac{300}{843}$					
C. rushii arne					$\frac{197}{984}$						
C. pandionis					$\frac{35}{322}$				$\frac{25}{209}$		
C. watsoni											
C. vulpidens											

BATHYMETRIC DISTRIBUTION—continued.

Yucatan Banks.	Caribbean mainland.	Bermuda.	Bahamas.	Cuba.	Jamaica.	Haiti-Santo Dom.	Porto Rico-St. Thos.	Lesser Antilles.	Barbados.	Brazil—North.	Brazil—South.	Fernando Noronha.	Argentine.
								$\frac{424}{880}$		1,109	20?		11?
	*							200	80				
								*					
									$\frac{25}{90}$				
25				$\frac{1}{12}$									
640				1,024				$\frac{464}{496}$					
25							390		$\frac{12}{100}$				
				413			390						
				$\frac{220}{287}$					$\frac{110}{140}$				
							*		100				
							390						
								161					
							390						
												25	
25			$\frac{3}{20}$	$\frac{3}{25}$				2	$\frac{6}{12}$				10
	*												
		$\frac{3}{20}$											
								464					
640								464					
								120					
1,002								120	$\frac{33}{100}$				
							25						
413	382												
							390						

TABLE SHOWING HORIZONTAL AND

Name.	North Europe.	Arctic-Nova Scotia.	Maine-Cape Cod.	Outer N. Eng. Banks.	So. N. Eng., N. J., Md., Va.	Hatteras.	N. Car., S. Car., Ga.	Florida E. Coast.	Florida Keys.	Florida W. Coast.	Texas-Mexico.
C. providensis								294			
C. elongatus										68	
C. greenlawi									130		
C. arctus										60	
C. braziliensis											
C. bushii											
C. lunula											
C. simpsoni											
C. amiantus											
C. nitidus											
C. miamiensis							294		85/269		
C. sauridens											
C. rastridens							440	294			
C. mayori									16/106	60	
C. minusculus						63					
C. iota									37/45		
C. subula											
C. verrilli					110/115						
C. regularis							440	294/509			
C. atlanticus					428/1061	516/843					
C. cylindratus					1525/1608						
C. acus								294			
C. dominguensis											
C. curtus											
C. congruens											
C. transitorius								294/504	90/125	169/196	
C. t. barbadensis											
C. ampullaceus											
C. exiguus											
C. obesus								294			
C. cucurbita											
C. platensis							440	294			
C. podagrinus											
C. halius											
C. tersus											

Figures are in fathoms; when in form of a fraction the enumerator represents the least recorded and without depth record.

BATHYMETRIC DISTRIBUTION—continued.

Yucatan Banks.	Caribbean mainland.	Bermuda.	Bahamas.	Cuba.	Jamaica.	Haiti-Santo Dom.	Porto Rico-St. Thos.	Lesser Antilles.	Barbados.	Brazil—North.	Brazil—South.	Fernando Noronha.	Argentine.
.....	$\frac{34}{152}$	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	59	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	$\frac{35}{100}$	.....	.....	.....	.....
.....	.....	.....	.....	805	.....	.....	.....	.....	70	.....	.....	.....	.....
.....	.....	.....	.....	100	.....	.....	25	120	.....	.....	.....	.....	.....
.....	.....	.....	.....	319	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	25	.....	.....	.....	.....	.....	.....
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the denominator the greatest recorded depths. An asterisk indicates occurrence of the species bu

SYSTEMATIC CONSIDERATION OF THE SPECIES.[1]

Genus DENTALIUM Linnaeus.

Subgenus DENTALIUM Linnaeus, 1758.

1758. *Dentalium* Linnaeus, Syst. Nat., ed. 10, p. 785.

Type.—*D. elephantinum* Linnaeus.

Tip polygonal; in the American species observed clearly hexagonal or if obscurely angled then giving rise to 9, 10, or 12 primary longitudinal ribs usually increased by intercalation of secondary ribs to a total rarely exceeding 20 altogether. The ribs are usually well developed and prominent, especially upon the posterior portion of the shell. Microscopic sculpture including both longitudinal and transverse series may or may not exist. Apical features are generally wanting but in some species a slight notch is observable on the convex side.

The shells of this subgenus are medium to fairly large in size—from 21 to 89 mm. in American forms.

The line of differentiation between this and the next subgenus—*Antalis* is ill defined. In general the latter group includes smaller and less obviously sculptured shells. The American species of *Dentalium* may be roughly grouped into those of 6 primary ribs and those of more than 6, and also those with and those without microscopic sculpture.

KEY TO THE SPECIES OF THE SUBGENUS DENTALIUM.

- Tip section hexagonal.
  - Intercostal spaces smooth.
    - Ribs rod-like and slender................................*texasianum*, page 27.
      - Intercalated ribs few.
        - Intercostal spaces flat..............*texasianum texasianum*, page 28.
        - Intercostal spaces rounded.............*texasianum rioense*, page 29.
      - Intercalated ribs numerous.................*texasianum cestum*, page 29.
    - Ribs not rod-like, broader ....*rebeccaense*, page 31.
  - Intercostal spaces not smooth.
    - Intercostal spaces microscopically engraved................*gouldii*, page 29.
      - Shell strongly curved.
        - Intercalated secondary ribs present.....*gouldii colonense*, page 31.
        - Intercalated secondary ribs absent...*gouldii portoricense*, page 30.
      - Shell not strongly curved.....................*gouldii gouldii*, page 30.

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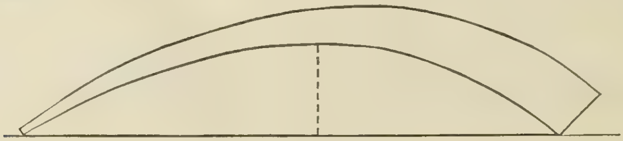
[1] In the description of species following the word "posterior" refers to that portion of the shell near the smaller or pointed end; "anterior" to that portion of the shell near the aperture or larger end. The "primary" ribs or riblets are the first or original longitudinals appearing on the tip of the shell; the "secondary" ribs or riblets are those later appearing or intercalated between the "primaries." The "arc" of the shell is a measure of curvature determined by the distance in millimeters from a line connecting the apex and aperture to the highest point above it in the concave arch of the shell. The drawing shows this more clearly than words.



Tip section not hexagonal.
  Primary ribs 9 ....*obscurum*, page 32.
  Primary ribs more than 9.
    Intercostal sculpture of transverse riblets...................*carduus*, page 33.
    Intercostal sculpture of latticed design..................*laqueatum*, page 23.
      Sculpture becoming obsolete near aperture.*laqueatum laqueatum*, page 24.
      Sculpture not becoming obsolete near aperture.*laqueatum regulare*, p. 26.

DENTALIUM (DENTALIUM) LAQUEATUM Verrill.

1885. *Dentalium laqueatum* Verrill, Trans. Conn. Acad. Arts Sci., vol. 6, pt. 2, p. 431, pl. 44, fig. 18.

1889. *Dentalium laqueatum*, Dall, Bull. Mus. Comp. Zool., vol. 18, pt. 2, p. 426, pl. 27, fig. 1.

1889. *Dentalium laqueatum*, Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 1; pl. 46, fig. 18.

1897. *Dentalium* (*Dentalium*) *laqueatum*, Pilsbry and Sharp, Tryon's Manual of Conch., vol. 17, p. 10, pl. 7, figs. 1, 2; pl. 5, fig. 73.

The shell is large with a maximum length and diameter of 62 by 6½ mm., rather thick, strong, gently curved, the tip being sharply curved. The tip is nine angled, quickly tapering; the balance of the shell only moderately so. Adult specimens are always without tips. Occasionally the shell is slightly flattened dorso-ventrally.

The color is dull white, opaque, neither glassy nor chalky. Nearly all the National Museum specimens are black stained on the posterior portion of the shell.

The sculpture consists of 9 to 12 strong elevated primary longitudinal ribs, with about equally spaced concave intercostal spaces. The ribs become broader and less elevated in about the middle portion of an adult shell, while the spaces between them become wider and flatter, with but slight intercalation of less important secondary ribs. On the anterior third the ribs degenerate into a rather smooth surface, or sometimes persist to the aperture. Over all the shell surface, including the ribs, is spread a finely reticulated sculpture, becoming only less apparent on the extreme anterior portion, or where worn off on the rib summits.

An apical notch on the convex side sometimes extends into a fairly long slit, but these apical characters are often quite obliterated.

Length, 45 mm., diameter, 6 mm. (Verrill, type).

Length, 51 mm., diameter, 6 mm., arc 1 (without tip).

Length, 55 mm., greater diameter, 6 mm., lesser diameter, 5.5 mm.

Length, 62 mm., greater diameter, 6.5 mm., lesser diameter, 6.5 mm.; arc, 1.5 (no tip).

Tips are easily recognizable, aside from their sculpture, by rapid increase in diameter, their sharp curve and the fluted peristome, the primary sculptural features being repeated on the inside of the shell. The nepionic tip is preserved in a Barbadian specimen which merits a description. The extreme end is bulbous, with a flaring opening which is somewhat produced or drawn out, and is perfectly smooth, exceedingly thin, and glassy. This bulbous portion of about 0.2 mm. length is followed by a constricted neck of about 0.2 mm. length, around which are several prominent growth bands. Following this constricted neck the shell begins its normal increase in girth as an exceedingly fragile round tube 1 mm. long, upon which appear faintly the beginnings of the primary ribs. These ribs increase in definiteness until the shell loses its round section and becomes polygonal in form. These primaries show a minute serration even before the interspaces assume their characteristic transverse sculpture. All of the portion so described, which measures about 3 mm. in length, is broken off and lost except in very rare instances. A normal tip measurement is: Length, 25 mm., diameter, 4 mm., with an arc of 3.1.

Variations are slight and may be referred chiefly to the degree of persistence shown by the primary ribs before they become flattened and finally merged into the smoothish anterior portion.

The type, Cat. No. 44671, U.S.N.M., was dredged at United States Bureau of Fisheries Station 2268 off Cape Hatteras, in 68 fathoms, gray mud, bottom temperature 71.3° F.

The extensive series in the National Museum collection shows extremes of depth from 10 to 193 fathoms and ranging from the Hatteras region to Barbados, including the Gulf of Mexico. It appears to be a very abundant species in the sandy mud ("green mud") along the inner edge of the Gulf Stream in the Florida Keys region, especially from off Fowey Light and Cape Florida.

It is an exceedingly well-marked species of very definite characters and not easily to be confused with any other species of the western Atlantic. Two subspecies are indicated.

DENTALIUM (DENTALIUM) LAQUEATUM LAQUEATUM Verrill.

Plate 1, figs. 6 and 7.

This subspecies includes the forms presenting the sculptural features described under *D. laqueatum* (p. 23) as losing distinctness and form in the anterior portion of the shell. All the sculptural elements of this species, consisting of primary and secondary ribs and a finely reticulated surface covering both the ribs and the spaces between them, become gradually merged into a smooth though not a polished surface. The type is the same as of *D. laqueatum*.

The following lots are in the United States National Museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	44671	Cape Hatteras, U. S. B. F. Station 2268	68 fms., gray mud, 71.3° (type).
44	93100	Cape Hateras, U. S. B. F. Station 2592	120 fms., fine gray sand, 58°.
6	93101	Cape Hatteras, U. S. B. F. Station 2596	49 fms., gray sand, 75°.
66	93102	Cape Hatteras, U. S. B. F. Station 2595	63 fms., sand, 75°, gray sand, broken sh.
4	93103	Cape Hatteras, U. S. B. F. Station 2600	87 fms., sand, 71.5° fine 97.3 broken sp broken sh.
1	93104	Cape Hatteras, U. S. B. F. Station 2602	124 fms., sand, 61° s. r.
3	93105	Cape Hatteras, U. S. B. F. Station 2603	124 fms., sand, s. r.
22	329529	Cape Hatteras, U. S. B. F. Station 2595	63 fms., gy s., brk. sh.
9	329902	Cape Hatteras, U. S. B. F. Station 2600	87 fms., gy. s. bk. sp. brk. sh 71.5°.
4	92822	Cape Florida, U. S. B. F. Station 2648	84 fms., gy. m.
4	314201	Miami, Florida, *Eolis* Station 14	40 fms.
4	314202	Fowey Light, *Eolis* Station 184	48 fms., s.
26	314203	Ragged Key, Florida, *Eolis* Station 190	70 fms., s.
18	314204	Ragged Key, Florida, *Eolis* Station 194	85 fms., fne. s.
18	314205	Fowey Light, *Eolis* Station 172	55 fine s.
18	314206	Fowey Light, *Eolis* Station 147	35 fms., crs. s.
1	330523	Cape Florida, U. S. B. F. Station 2644	193 fms., gy. s., 43.4°.
15	314207	Ragged Key, Florida, *Eolis* Station 166	65 fms.
14	314208	Fowey Light, Florida, *Eolis* Station 182	75 fms., s.
20	314209	Ragged Key, Florida, *Eolis* Station 191	71 fms., s.
14	314210	Miami, Florida, *Eolis* Station 113	18–20 fms., s.
16	314211	Fowey Light, Florida, *Eolis* Station 104	50 fms., s.
15	314212	Fowey Light, Florida, Station 354	80 fms., s.
33	314213	Sand Key, Florida, *Eolis* Station 56	70 fms., s.
16	314214	Fowey Light, Florida, *Eolis* Station 178	68 fms., s.
24	314215	Fowey Light, Florida, *Eolis* Station 170	53 fms., s.
16	314216	Fowey Light, Florida, *Eolis* Station 156	47 fms., s.
14	314217	Fowey Light, Florida, *Eolis* Station 168	65 fms., s.
29	314218	Fowey Light, Florida, *Eolis* Station 167	65 fms., s.
15	314219	Miami, Florida, *Eolis* Station 87	63 fms., s.
5	314220	Miami, Florida, *Eolis* Station 68	45 fms., s.
19	314221	Fowey Light, Florida, *Eolis* Station 176	52 fms., s.
20	314222	Fowey Light, Florida, *Eolis* Station 165	78 fms., s.
11	314223	Fowey Light, Florida, *Eolis* Station 181	71 fms., s.
10	314224	Fowey Light, Florida, *Eolis* Station 180	76 fms., s.
16	314225	Fowey Light, Florida, *Eolis* Station 173	58 fms., s.
20	314226	Fowey Light, Florida, *Eolis* Station 309	60 fms., s.
6	314227	Fowey Light, Florida, *Eolis* Station 92	45 fms., s.
16	314228	Fowey Light, Florida, *Eolis* Station 153	
30	314229	Fowey Light, Florida, *Eolis* Station 177	60 fms., s.
33	314230	Fowey Light, Florida, *Eolis* Station 151	55 fms., s.
16	314231	Fowey Light, Florida, *Eolis* Station 308	65 fms., s.
25	314232	Fowey Light, Florida, *Eolis* Station 307	70 fms., s.
31	314233	Fowey Light, Florida, *Eolis* Station 175	60 fms., s.
3	314234	Fowey Light, Florida, *Eolis* Station 109	40 fms., s.
17	314235	Fowey, Florida, *Eolis* Station 130	25 fms., s.
14	314236	Miami, Florida, *Eolis* Station 116	65 fms., gn. m.
5	314237	Fowey, Florida, *Eolis* Station 76	40 fms., s.
19	314238	Fowey Light, Florida, *Eolis* Station 174	58 fms., s.
19	314239	Fowey Light, Florida, *Eolis* Station 148	38 fms., s.
13	314240	Fowey Light, Florida, *Eolis* Station 152	40 fms., s.
12	314241	Fowey Light, Florida, *Eolis* Station 155	43 fms., s.
12	314242	Fowey Light, Florida, *Eolis* Station 179	70 fms., s.
7	314243	Fowey Light, Florida, *Eolis* Station 171	53 fms., s.
46	314244	Fowey Light, Florida, *Eolis* Station 169	70 fms., s.
14	314245	Miami, Florida, *Eolis* Station 138	60 fms., s.
17	314246	Cape Florida, *Eolis* Station 189	67 fms., s.
22	314247	Fowey, Florida, *Eolis* Station 186	68 fms., s.
15	314248	Fowey Light, Florida, *Eolis* Station 184	48 fms., s.
12	314249	Miami, Florida, *Eolis* Station 48	60 fms., s.
3	314250	Fowey Light, Florida, *Eolis* Station 104	50 fms., s.
11	314251	Fowey Light, Florida, *Eolis* Station 154	42 fms., s.
1	314252	Miami, Florida, *Eolis* Station 125	30 fms., s.
9	314253	Fowey, Florida, *Eolis* Station 120	25 to 30 fms., s.
27	314254	Fowey Light, Florida, *Eolis* Station 355	70 fms., s.
4	314255	Ragged Key, Florida, *Eolis* Station 192	75 fms., s.
1	314256	Caesars Creek Bank, *Eolis* Station 40	10 feet s.
2	314257	Miami, Florida, *Eolis* Station 51	24 fms., s.
24	314258	Fowey Light, Florida, *Eolis* Station 352	90 fms., s.
3	314259	Ragged Key, Florida, *Eolis* Station 191	71 fms., s.
1	314260	Miami, Florida, *Eolis* Station 68	45 fms., s.
1	97178	Cape Florida, Florida, U. S. B. F. Station 2646	85 fms., gy. s. for.
5	314261	Long Reef, Florida, *Eolis* Station 145	40 fms., s.
8	314262	Long Reef, Florida, *Eolis* Station 136	58 fms., s.
9	314263	Ajax Reef, Florida, *Eolis* Station 137	40 fms., s.
11	314264	Ajax Reef, Florida, *Eolis* Station 370	70 to 90 fms., s.
15	314265	Ragged Key, Florida, *Eolis* Station 365	75 fms., s.
8	314266	Ajax Reef, Florida, *Eolis* Station 368	100 to 180 fms., gn. m.
4	330428	Carysfort Light, Florida, U. S. B. F. Station 2641	60 fms., co. s., 69.2°
2	314267	Western Dry Rocks, Florida, *Eolis* Station 321	65 fms.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314268	Miami, Florida, *Eolis* Station 48	60 fms., gn m.
1	314269	Fowey Light, Florida, *Eolis* Station 174	58 fms., s.
13	314270	Sambo Reef, Florida, *Eolis* Station 196	58 fms., s.
4	314271	Sambo Reef, Florida, *Eolis* Station 195	50 fms., s.
1	314272	Sand Key, Florida, *Eolis* Station 3	69 fms., s. br. sh.
37	314273	Sand Key, Florida, *Eolis* Station 32	61 fms., s.
3	314274	Sand Key, Florida, *Eolis* Station 161	76 fms., s.
65	314275	Sand Key, Florida, *Eolis* Station 160	62 fms., s.
42	314276	Sand Key, Florida, *Eolis* Station H	60 to 65 fms., s.
1	314277	Key West, Florida, *Eolis* Station 44	50 fms., s.
35	314278	Key West, Florida, *Eolis* Station 43	63 fms., s.
3	314279	Sand Key, Florida, *Eolis* Station 98	70 to 90 fms., s.
5	314280	Key West, Florida, *Eolis* Station 5	60 fms., s.
2	314281	Key West, Florida, *Eolis* Station 1	55 fms., s.
1	314282	Sand Key, Florida, *Eolis* Station 323	110 fms.
1	95333	Sand Key, Florida, *Bibb* Station	120 fms. (Pourtales).
10	314283	Key West, Florida, *Eolis* Station 38	
41	314284	Sand Key, Florida, *Eolis* Station 32	61 fms., s.
11	314285	Sand Key, Florida, *Eolis* Station 159	58 fms., s.
17	314286	Sand Key, Florida, *Eolis* Station 32	61 fms., s.
3	314287	Sand Key, Florida, *Eolis* Station, 31	90 fms., s.
9	314288	Sand Key ,Florida, *Eolis* Station 300	72 fms., s.
3	314289	Key West, Florida, *Eolis* Station 43	63 fms., s.
3	181153	Tortugas, Florida, U. S. C. S. Station 26	110 fms., s.
3	323957	Cape San Blas, Florida, U. S. B. F. Station 2404.	60 fms., gy. s.
2	323597	Mississippi River (off), U. S. B. F. Station 2378	68 fms., gy. m.
2	323985	Gulf of Mexico, U. S. B. F. Station 2404	60 fms., gy. s.
1	93956	Off Habana, Cuba, U. S. B. F. Station 2327	182 fms., per br. s.
1	93820	Off Habana, Cuba, U. S. B. F. Station 2337	199 fms., co.
3	95334	Off Habana, Cuba, U. S. C. S. Station	119 fms.
13	95336	Off Sombrero, U. S. C. S. Station 5	54 fms.
1	94114	St. Thomas, West Indies	Shore.
1	95337	Grenada, U. S. C. S. Station 246	154 fms. dk. gy. oz.
6	95335	Barbados U. S. C. S. Station	100 fms.

DENTALIUM (DENTALIUM) LAQUEATUM REGULARE, new subspecies.

Plate 1, fig. 8.

Four lots in the National Museum collection from Jamaica and Barbados carry the ribs without change, even in fully adult specimens, to the oral end of the shell. The 12 ribs in the specimen selected as a type are prominent and are neither modified nor flattened at their termination in the aperture rim of the shell. The fine reticulation and all other features remain as in typical forms (*Dentalium laqueatum laqueatum*).

The type, Cat. No. 107887, U.S.N.M., measuring 40.5 mm. in length and 5.5 mm. in diameter, was collected by C. B. Adams in Jamaica, without depth record.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	107887	Jamaica (C. B. Adams)	
4	314885	Antigua, S. U. I. Expedition Station 115	120 fms., sd.
1	95339	Barbados, U. S. C.S. Station 293	81 fms., co. s. 64.5°
3	95340	Barbados, U. S. C. S. Station 296	85 fms., hrd. s. 61.5°
1	95338	Barbados, U. S. C. S. Station 290	73 fms., co., s. sh. 70¾°
3	314886	Barbados, S. U. I. Expedition Station 60	110 fms.
2	314887	Barbados, S. U. I. Expedition Station 10	100 fms.
1	314888	Barbados, S. U. I. Expedition Station 40	90 fms.
1	314889	Barbados, S. U. I. Expedition Station 44	90–100 fms.
5	314890	Barbados, S. U. I. Expedition Station 38	140 fms. (fragments and tips).
1	314891	Barbados, S. U. I. Expedition Station —	— fms. (tip).

[1] Type.

DENTALIUM (DENTALIUM) TEXASIANUM Philippi.

(?)1843. *Dentalium americanum* Chenu, Conch. Ill., vol. 1, p. 1, pl. 4, figs. 9, 10 (all subsequent references in European literature).

(?)1843. *Dentalium americanum* var. *c*, Chenu, Conch. Ill., vol. 1 (index), pl. 6, fig. 35 (not pl. 4, figs. 9, 10).

1848. *Dentalium texasiana* Philippi, Zeitschr. Malak., p. 144.

1878. *Dentalium sexangulare* Hilgard and Hopkins, Report Borings Miss. River, and Lake Borgue, Engineer's Dept., U. S. A., p. 48, pl. 3, fig. 7 (not of Lamarck).

1889. *Dentalium gouldii* Dall, Bull. Mus. Comp. Zool., vol. 18, pt. 2, p. 424 (not pl. 27, fig. 4), in part.

1889. *Dentalium gouldii* Dall, Bull. 37, U. S. Nat. Mus., p. 76, in part (not fig.).

1896. *Dentalium gouldii* Guppy and Dall, Proc. U. S. Nat. Mus., vol. 19, p. 325, in part.

1897. *Dentalium* (*Dentalium*) *texasiana*, Pilsbry and Sharp, Tryon's Man. of Conch., vol. 17, p. 22.

1897. *Dentalium gouldii*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 20 (not pl. 7, fig. 14), in part.

1903. *Dentalium gouldii* Dall, Bull. 37, Reprint, U. S. Nat. Mus., p. 76, in part.

The following essential features are taken from topotypes in the National Museum collection.

The shell is rather strongly curved in the posterior portion, but less so anteriorly; very slowly increasing in diameter. It is hexagonal in section; dull gray-white in color, not glassy or porcellanous, but opaque, solid and strong. The tip is hexagonal, the angles soon becoming narrow rod-like ribs, separated by wide, flat interspaces, smooth save for ill-defined widely separated growth lines or wrinkles. Intercalation of one or two, rarely three, longitudinal riblets may or may not take place. The ribs persist to the end, though less definitely marked anteriorly, but the shell often preserves the hexagonal section throughout. When greater intercalation is present the hexagonal section is less obvious at the oral aperture. In senile specimens all sculptural features may be almost lost at the extreme anterior end the shell then becoming a roughly rounded cylinder. The growth lines are more prominent in the anterior portion of the shell, almost attaining the importance of transverse sculpture. The apical characters remain doubtful; none of the museum specimens show either notch or slit. Many specimens have a projecting tube from the posterior orifice, but this is not a specific character.

Length, 31 mm., diameter, 2 mm. (composite specimen made up of tip and fragment), Sanibel Island, Florida.

Length, 21 mm.; diameter, 2 mm.; arc, 1.5, Sanibel Island, Florida (without tip).

Topotypes, Cat. Nos. 125552 and 134447, U.S.N.M. (Galveston).

Although Philippi's description is very brief, his definite locality of "Galveston" makes it possible to utilize his short diagnosis with reasonable certainty. The figures of Chenu seem to indicate this shell, but as they are accompanied by insufficient description and with vague or no locality data, I deem it best to set them aside with a query. The same reasons would apply for discarding *Dentalium pictei* Deshayes, a manuscript name. They probably represent some form of this group of which *D. texasianum* stands as a sort of super species. Doctor Dall and Doctor Pilsbry have occasionally confused this shallow water species with the former's *D. gouldii*, a closely allied species.

The inclusion of Brazilian specimens with a Texan type and North Carolina typical specimen seems questionable, but the evidence offered by the shells themselves is supplemented by the specific identity of many other mollusks from these relatively distant points. Nor is it entirely strange that the Florida Keys region and Antilles should have contributed no examples.

Some geographical races of this widely distributed species seem to be indicated.

DENTALIUM (DENTALIUM) TEXASIANUM TEXASIANUM Philippi.

Plate 1, figs. 2, 4, 5, and 9.

The shell is characterized by the flat, broad intercostal spaces in which the minimum of intercalation takes place—often none whatever. This form is from Texas, Louisiana, West Florida, North Carolina, and probably has a range from Yucatan to North Carolina, exclusive of the Florida Keys and Florida east coast.

Specimens from Pass Cabello, Texas, Cat. No. 159503, U.S.N.M., collected by J. D. Mitchell, without data, measure:

Length, 24 mm.; diameter, 2 mm.

Length, 20 mm.; diameter, 2 mm.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314290	Beaufort Harbor Fish Commission, North Carolina, Station D. 7930.	4 fms., S. (August, 1913).
14	314291	Off Beaufort, North Carolina, *Eolis* Station 21	6-9 fms., S.
1	314292	Cape Lookout Bight, North Carolina, Station 20	3 fms.
50	228739	Sanibel Island, Florida	(W. F. Clapp.)
1	177962	Cameron, Louisiana	(R. P. Cowles.)
4	125552	Galveston and Corpus Christi, Texas	(Singley.)
2	134447	Galveston Bay, Texas	Do.
4	159503	Pass Cabello, Texas	(Mitchell.)
3	314839	Inlet Channel, opposite Perry's Island	Fish Commission.

DENTALIUM (DENTALIUM) TEXASIANUM CESTUM, new subspecies.

Plate 2, figs. 1, 4, 8.

The shell is characterized by an abundant intercalation of rather heavy cord-like riblets, which assume equal importance with the primaries and in the mature and senile stages obscure the hexagonal section of the shell.

The type, Cat. No. 159503 (*a*), U.S.N.M., is from Pass Cabello, Texas. It measures 18 mm. in length, with a diameter of 2 mm., and was collected by J. D. Mitchell. It is the only specimen of the lot and is without station data. It is probably a beach specimen and of very shallow depth range.

DENTALIUM (DENTALIUM) TEXASIANUM RIOENSE, new subspecies.

Plate 2, figs. 2, 3.

The shell is characterized by its rounded smooth intercostal spaces and by little or no intercalation of secondary ribs. The primary six rod-like ribs are even more slender and delicate than in the subspecies *D. t. texasianum.*

The type, Cat. No. 96114, U.S.N.M., measures: Length, 17.2 mm.; diameter, 1.5 mm. It is from east of Rio de Janeiro, at U. S. B. F. station 2762, in 59 fathoms, blue mud, bottom temperature 57.1° F., from a lot of 12 specimens.

There are also four specimens from the same original lot, Cat. No. 203143, U.S.N.M.; also one specimen, Cat. No. 150784, U.S.N.M., from San Sebastian, Brazil, presented by Ihering without additional data.

DENTALIUM (DENTALIUM) GOULDII Dall.

1889. *Dentalium gouldii* Dall, Bull. Mus. Comp. Zool., vol. 18, pt. 2, p. 424, in part.
1889. *Dentalium gouldii* Dall, Proc. U. S. Nat. Mus., vol. 12, p. 295, in part.
1889. *Dentalium gouldii* Dall, Bull. 37, U. S. Nat. Mus., p. 76, in part.
1896. *Dentalium gouldii*, Guppy and Dall, Proc. U. S. Nat. Mus., vol. 19, p. 325, in part.
1897. *Dentalium* (*Dentalium*) *gouldii*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 20, not pl. 7, fig. 14, in part.

The shell is hexagonal, slightly curved, regularly tapering and solid; white, vitreous, polished, and shining. It is six-angled at the apex, the angles becoming narrow, pinched-up, rod-like ribs, separated by broad flat spaces. Between these spaces are microscopically fine engraved longitudinal lines, more or less apparent, about 16 in the space of 1 mm., extending from the apex over about one-fourth the length of the shell and then terminating quite suddenly; the intercostal surfaces thereafter are smooth and polished with some transverse growth line scratches. The primary ribs become less defined anteriorly, but the hexagonal section is usually preserved, though not so distinctly at the aperture. There is no intercalation of secondary ribs except in one form, later described. No apical features are shown in any National Museum specimens.

The type, Cat. No. 82997, U.S.N.M., measures: Length, 29 mm.; diameter, 2.75 mm.; arc, 1 (tip gone); and is from 12 miles east of Frying Pan Shoals in 12 fathoms. It was collected by Doctor Rush, who has given no further data.

The glossy hyaline surface, the fine longitudinal engraved lines, and the general faces of this shell separate it from *D. texasianum.* It is apparently a moderate depth species. Three subspecies are indicated by the National Museum material.

The very few records in the National Museum collection, which are particularly referred to under the subspecific headings, indicate this to be a species of wide Antillean and Gulf Stream range, but not an abundant one at any known station.

DENTALIUM (DENTALIUM) GOULDII GOULDII Dall.

Plate 2, figs. 6, 7.

This subspecies, answering the original description of Doctor Dall for *Dentalium gouldii,* may be characterized by the well-marked microscopic sculpture within the intercostal spaces of its shell; by its straight outline, and the complete absence of any intercalation of secondary ribs. The intercostal sculpture, consisting of longitudinal lines, is sufficiently marked to be visible to the unaided eye.

The single specimen in the National Museum collection is the type referred to in the description of *D. gouldii,* next preceding. As this particular form of *D. gouldii* has not appeared at any of the many Florida shallow dredging stations it is undoubtedly a form of narrow geographical range and confined to the inner Gulf Stream edge off the Carolinas and Georgia.

DENTALIUM (DENTALIUM) GOULDII PORTORICENSE, new subspecies.

Plate 2, fig. 5.

1901. *Dentalium gouldii* Dall and Simpson, U. S. Fish. Comm. Bull. 1, 1900, p. 455.

The shell is hexagonal, thin but strong, vitreous, with a polished surface; the ribs are narrow and rod-like, separating broad flat spaces, which lack the clearly defined, very fine longitudinal lines of *D. g. gouldii,* although in oblique light they may be detached by use of a strong lens. The ribs become less defined anteriorly, while the intercostal spaces become convex, both finally merging in senile specimens into a round cylinder, the merest traces of the ribs remaining visible at the aperture. No intercalation of secondary ribs is shown. The apical characters are uncertain. The curvature of the shell is greater than in the typical subspecies and is uniform throughout the entire length of an adult shell.

The type, Cat. No. 161568, U.S.N.M., measures: Length, 42 mm.; diameter, 3 mm.; arc, 4 (without tip). It is from Mayaguez Harbor, Porto Rico, U. S. B. F. Station 6062, in 25 to 30 fathoms, on bottom of sand mud and shells, bottom temperature 75.8° F. Another lot of two young specimens, Cat. No. 161567, U.S.N.M., is from the same station.

DENTALIUM (DENTALIUM) GOULDII COLONENSE, new subspecies.

Plate 3, fig. 6.

1889. *Dentalium gouldii* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 424, in part.
1897. *Dentalium gouldii*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 20, in part.

The shell is highly polished, glassy, thin but strong, milky white, and of fairly even curvature. The apical fifth is hexagonal with ribs very narrow and rod-like, giving wide intercostal spaces which show evanescent microscopic longitudinal engraved lines, less distinct than in *D. g. gouldii* but more so than in *D. g. portoricensis*. In the second fifth from the apex intercalation of one secondary rib between each two primaries begins and later additions confuse the hexagonal section of the shell. All ribs tend to decrease, and the anterior third of the shell is round, smooth, and vitreous, no trace of any sculpture remaining. No notch or slit is shown in the National Museum specimen.

The type, Cat. No. 94085, U.S.N.M., measures: Length 35 mm.; diameter, 2.75 mm.; arc, 2; was dredged at the U. S. B. F. Station 2145, near Colon, in 25 fathoms, on green mud and broken shells, no bottom temperature record being given. The type is the unique specimen.

This shell differs from the typical subspecies in the lesser development of all the sculptural characters, and again in the intercalation of secondary ribs, and finally in its degree of curvature.

DENTALIUM (DENTALIUM) REBECCAENSE, new species.

Plate 3, fig. 2.

Two lots in the National Museum collection belonging to the group of hexagonal tip species resist identification with any of the published forms. The specimens are all juvenile, but I am sufficiently convinced they are new to venture upon a description, even though the adult characters can not be given.

The shell is hexagonal, with a very attenuate and sharply curved tip, the six angles quickly assuming the character of pinched-up rounded ribs, separating rather broad, not quite flat intercostal spaces. No fine sculpture is indicated, but lines of opacity in a portion of the spaces between the ribs sometimes simulate a very close transverse system of lirae. There is no intercalation of secondary ribs in these thin, white juvenile specimens, nor notch nor other apical characters observable.

The type, Cat. No. 314293, U.S.N.M., measures: Length, 13 mm.; diameter, 1.75 mm.; arc, 1. It was dredged between Tortugas and Rebecca Shoals, Florida, in 16 fathoms on coral sand, Eolis Station 33, and is chosen from a lot of 26 specimens.

Another specimen, Cat. No. 314294, U.S.N.M., comes from 5 miles off the north entrance to Key West Channel in the Gulf of Mexico, 7 fathoms, sand bottom, being Eolis Station 30.

The hexagonal section is confined only to the tip, as the angles quickly assume the character of primary ribs, as in *D. laqueatum*, thus differing from *D. texasianum* and *D. gouldii*, nor are the intercostal spaces as broad or as flat as in those last two species. The exceedingly slender curved tips are like delicate spun glass, transparent and fragile; the intercostal spaces remain very thin and break at the aperture rim, leaving the peristome with the ribs projecting as in young *D. laqueatum*.

Superficially the little shells look exceedingly like the tips of *D. laqueatum*, but they are at once distinguishable by their more slender shape and again by the total absence of a reticulated surface.

DENTALIUM (DENTALIUM) OBSCURUM Dall.

Plate 3, figs. 1, 3.

1889. *Dentalium gouldii obscurum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 424, pl. 27, fig. 41.

1897. *Dentalium gouldii obscurum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 20, pl. 7, fig. 4.

The shell is awl-shaped, or in general, straight with a moderate curve only in the tip, and is regularly though slowly increasing in diameter. It is vitreous, solid, thin but strong, and with an oily white surface. The tip is polygonal, with nine primary ribs, narrow and sharp, separating flat wide spaces. At the beginning of the second third from the apex the ribs increase by intercalation to twice the original number or even more. All the ribs, both primary and secondary, assume about equal importance and take on a roughened wavy aspect, as though irregularly noduled, an effect seemingly, though not really, caused by growth lines; these growth lines may be seen as merely microscopically fine transverse scratches. The surface character continues to the oral end of the adult shell, there being no degeneration of the ribs into a smooth cylinder. No apical notch or slit is indicated.

The type and four specimens, Cat. No. 95351, U.S.N.M., were dredged by the *Blake*, U. S. C. S. Station 229 off Barbados, in 140 fathoms, on a bottom of coral and broken shell, and temperature of 56.5° F.

One specimen, Cat. No. 95372, U.S.N.M., also taken by the *Blake* at U. S. C. S. Station No. 300, off Barbados, in 82 fathoms, bottom temperature 60°.

Seven specimens, Cat. No. 95330 (*a*), U.S.N.M., were taken by the *Hassler,* U. S. C. S. Station 220, off Sandy Bay, Barbados, in 100 fathoms. Specimens were also taken by the State University of Iowa Expedition of 1918 in 125 fathoms, off Bridgetown, Barbados, being State University of Iowa Station 62.

The greater number of ribs removes this species from the *D. texasianum* group; the curiously roughened appearance suggests a fancy that the shell had suffered a slight melting or softening of its surface. The features appear to be very constant; a narrow variation decreasing the slight curve in the tip to an almost straight shell is observed in a few specimens.

It is evidently a moderate depth species of the lesser Antilles, though as yet only recorded from Barbados.

DENTALIUM (DENTALIUM) CARDUUS Dall.

Plate 3, figs. 4, 5, 7.

1889. *Dentalium carduus* DALL, Bull. Mus. Comp. Zool., vol. 18, pt. 2, p. 423, pl. 27, fig. 3.

1889. *Dentalium carduus* DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 3.

1897. *Dentalium (Dentalium) carduus,* PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 30, pl. 7, fig. 6.

1903. *Dentalium carduus* DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 3.

The shell is very long and slightly curved, mostly in the posterior third, increasing evenly in diameter; solid, but not thick; slightly compressed dorso-ventrally. It is pure white, with an ashy hue, and sometimes exhibits rusty patches, possibly due to extraneous matter, and is not polished or bright. The sculpture consists of 16 narrow longitudinal ribs, which, just below the tip, are separated by wide, flat spaces. These primary ribs are increased by intercalation, all being of equal importance and continuous; though growing flatter and wider, they do not disappear at the aperture, even in fully adult shells. The entire surface is covered by elevated, transverse riblets of which there are 16 to 20 to the millimeter, appearing like circular lamellae, and which, in crossing the longitudinal ribs, produce a rasp-like surface. This feature is best observed in the posterior half of the shell, but persists in modified degree even to the aperture. There is a dorsally placed, rather deep apical notch.

Length, 87 mm.; diameter, 7 mm. (Dall).

Length, 77 mm.; diameter, 7 mm.; arc, 3.75 (Grenada).

The type is in the Museum of Comparative Zoology, Cambridge, Massachusetts, and was dredged off Santa Lucia, in 116 fathoms. In the United States National Museum are three lots: One specimen, Cat. No. 95322, U.S.N.M., dredged at United States Bureau of Fisheries Station 2655 on Little Bahama Bank, in 338 fathoms, sand bottom, and temperature of 47.5°; one specimen, Cat. No. 95321, U.S.N.M., taken by the *Blake* at United States Coast Survey Station

246, off Grenada, in 154 fathoms, ooze, bottom temperature 56°. It was also dredged in Barbados by the State University of Iowa Expedition in about 100 fathoms.

The transverse sculpture imparting a rough file-like surface to the shell is a feature at once separating this large species from any other of the region under consideration. It appears to belong to the continental slope zone, and is at present only known from the Lesser Antilles and the Bahamas in temperatures ranging from 47.5° to 58° F.

Subgenus ANTALIS H. and A. Adams, 1854.

1854. *Antalis* H. and A. Adams, Gen. Rec. Moll., vol. 1, p. 457 (1854).[1] Type, *D. entalis* Linnaeus.

Tip prismatic or round, with primary riblets ranging from 6 to 18, which are less strongly developed and prominent than in *Dentalium* s. s. and generally disappear entirely in the senescent stages of the shell if not earlier. The apical characters consist of a notch on the convex side or may be lacking. Transverse sculpture is variable or absent.

As already noted the differences between this and the preceding subgenus are not very sharply drawn. It seems to have been made the receptacle for various forms of *Dentalia* that do not readily fit elsewhere, hence the group is a somewhat heterogeneous one. The American species referred here are all less strongly ribbed than are those included under *Dentalium* s. s. The American species conveniently group as follows:

SYNOPSIS OF THE GROUPS OF ANTALIS.

Primary ribs 16–18, more or less distinct; senile stage sculptureless. Northern distribution..............................group of *Dentalium occidentale*, page 34.
Primary ribs 16–18, well defined; senile stage sculptureless, glazed. Southern distribution..............................group of *D. bartletti*, page 54.
Primary ribs 9–14, fine; color pattern absent; senile stage polished; intercostal sculpture present..............................group of *D. ceratum*, page 49.
Primary ribs 9, coarse; color pattern present; senile stage not polished; intercostal sculpture present..............................group of *D. antillarum*, page 43.
Primary ribs 6, their distribution unsymmetric.........group of *D. disparile*, page 47.

KEY TO THE GROUP OF DENTALIUM OCCIDENTALE.

Distinctly sculptured.
  Long and slender (over 40 mm.)................*Dentalium agile subagile*, page 38.
  Not long and slender (under 40 mm.).
    Sculptural features confined to outer superficial shell layer.
      D. occidentale, page 40.
    Sculptural features not confined to outer superficial shell layer.
      D. occidentale georgiensis, page 43.
Not distinctly sculptured..............................*D. entalis stimpsoni*, page 35.

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[1] For discussion of the extensive synonymy of *Antalis* see Pilsbry and Sharp, in Tryon's Manual of Conchology, vol. 17, pp. 37 and 38.

DENTALIUM (ANTALIS) ENTALE STIMPSONI, new name.

Plate 4, figs. 2, 3, 4.

1843. *Dentalium entalis,* MIGHELS, Boston Journ. Nat. Hist., vol. 4, No. 3, p. 330. (Not Linnaeus.)

1851. *Dentalium striolatum* STIMPSON, Proc. Bost. Soc. Nat. Hist., vol. 4, p. 114. (Not *D. striolatum* of Jeffreys, Watson, or Sars, nor of Risso, 1826.)

1851. *Dentalium striolatum* STIMPSON, Shells of New England, p. 28.

1853. *Dentalium, striolatum* STIMPSON, Marine Invert. of Grand Menan, Smithsonian Contrib. to Knowledge, p. 22.

1860. *Entalis striolata* STIMPSON, Smithsonian checklists East Coast, p. 4.

1870. *Entalis striolata,* BINNEY, Gould Invt. of Mass., p. 266, fig. 528.

1873. *Dentalium striolatum,* TRYON, American Marine Conchology, p. 96, pl. 12, fig. 96.

1874. *Entalis striolata,* SMITH and HARGER, Trans. Conn. Acad. of Arts and Sci., vol. 3, pt. 1, p. 23, pl. 1, fig. 3.

1880–81. *Dentalium striolatum,* VERRILL, Proc. U. S. Nat. Mus., vol. 3, p. 408.

1883. *Dentalium striolatum,* BUSH, Fish Comm. Report for 1883, No. 17, p. 717.

1884. *Dentalium striolatum,* VERRILL, Trans. Conn. Acad. of Arts and Sci., vol. 6, pt. 1, pp. 276, 283.

1884. *Dentalium striolatum,* VERRILL, Fish. Comm. Report for 1883, No. 16, p. 573.

1887. *Entalis striolata,* GANONG, Bull. Nat. Hist Soc. of New Brunswick, vol. 6, p. 39.

1893. *Dentalium striolatum* BUSH, Bull. Mus. Comp. Zool., vol. 23, No. 6, pp. 224, 239.

1897. *Dentalium (Antalis) entalis,* PILSBRY and SHARP, Tryon's Man. of Conch., vol. 17, p. 42, in part (not pl. 8, fig. 25).

1901. *Dentalium entalis,* WHITEAVES, Cat. Marine Inv. of E. Canada, p. 152 (Ottawa).

1904. *Dentalium entalis* BLANEY, Proc. Boston Soc. Nat. Hist., vol. 32, No. 2, p. 30.

1908. *Dentalium entalis,* LERMOND, Shells of Maine, p. 15 (Thomaston, Maine).

1915. *Dentalium entalis* JOHNSON, Occasional Papers, Boston Soc. Nat. Hist., No. 13, p. 82.

The shell is very moderately curved, and that chiefly in the posterior fourth; with a rather rapid increase in diameter during the first third; its section is round. The surface is of a dull ivory white, usually more or less discolored. The outer shelly layer covers a softer chalky middle layer, while the inner layer of the tube is hard and smooth. The tips are almost invariably much eroded. Sculpture, save for some longitudinal wrinkles in the posterior quarter or third portion of the shell, is absent. These wrinkles are confined to the outer shell layer and are not always readily observed. The surface of the shell is not perfectly smooth because of irregularities of growth, but the most smooth specimens never exhibit a polished or shining surface. An apical notch is present on the convex side.

Length, 33 mm.; diameter, 4.75 mm.; arc 2 (tip gone). Grand Manan.

Length, 38 mm.; diameter, 4.75 mm.; arc. 2 (tip gone). Grand Manan.

Length, 53.5 mm.; diameter, 5.75 mm.; arc 2.2 (tip gone). Maine, 29 fathoms.

Length, 21 mm.; diameter, 3.5 mm.; arc 2.5 (entire). Gotts Island, Maine.

Length, 44 mm.; diameter, 5.5 mm.; arc 2.5 (tip gone). Kimball Island, Maine.

Length, 36.5 mm.; diameter, 6 mm.; arc 1.5 (tip gone). Gulf of Maine, 36 fathoms.

The type, Cat. No. 314938, U.S.N.M., was collected by the *Eolis* in 20 fathoms, near Gotts Island, off Mount Desert, Maine, from a lot of nine specimens. It measures—length, 38 mm.; diameter 4.8 mm.; with an arc of 2.5.

The museum collection contains a very large series of specimens from the Bay of Fundy and the coast of Maine in shallow water; and from off southern New England and the Virginia Capes on the continental slope. This is a northern cold-water species and is the common shallow water *Dentalium* of New England north of Cape Cod.

There seems to be no question about the specific identity of the western Atlantic shells with the *D. entale* of Linnaeus from European waters. However, the American specimens are generally of a more chalky texture, with a more brittle, thin external layer, and display their faint sculptural features more clearly than do the European specimens. A trayful of eastern Atlantic examples presents a cleaner, whiter, less eroded appearance, owing to the harder, most compact texture of the outer shell layer. There is sufficient constancy in these characters to warrant a subspecific value. Stimpson's name being preoccupied, I have substituted the one here presented.

The lack of definite sculpture distinguishes this from *D. occidentale*, the only other *Dentalium* of the region from moderate depths. The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
42	50342	Between St. Peters and Bauguereau (off Nova Scotia) U. S. B. F. Station 2488.	150 fms., 53°, yl. s.
1	74906	Off Nova Scotia, U. S. B. F. Station 128	36 fms., 43.5 m. fne. s.
1	74902	Bedford Basin, Halifax, U. S. B. F. Station 63–67	26–41 fms., 34°, m.
2	74877	Seal Cove, Grand Menan	8–10 fms.
3	314314	Cape Sable, Nova Scotia (W. F. Clapp, collector)	100 fms., G. (O. Bryant).
4	74875	Grand Menan, U. S. B. F	
120	159702	Grand Menan, U. S. B. F	(Webster.)
27	83437	Grand Menan	(Stimpson.)
1	74879	Bay of Fundy, U. S. B. F. 97	106 fms., 38°.
31	83449	Eastport, Maine	(Verrill and Smith.)
3	59709	Eastport	
3	73286	Eastport	(Stimpson.)
27	74886	Eastport, Maine, U. S. B. F	
7	314315	Eastport, Maine (J. B. H. collector)	
18	314316	Eastport, Maine, (W. F. Clapp, collector)	(N. W. Winkley.)
16	314317	Eastport, Maine	(J. B. Henderson.)
24	10318	Eastport, Maine	(Stimpson.)
30	314318	Little River Light, Maine	40 fms. (J. B. Henderson).

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
18	314319	Frenchmans Bay, Maine	(J. B. Henderson.)
13	184964	Frenchmans Bay, Maine	(D. Blaney.)
17	314320	Long Island, Maine	29 fms. (J. B. Henderson).
8	314321	Gotts Island, Maine	20 fms. (J. B. Henderson), topotypes.
8	314322	Off Bakers Island, Maine	20 fms.
2	314323	Isle au Haut, Maine (W. F. Clapp, collector)	
6	314324	Kimballs Island, Maine (W. F. Clapp, collector)	(F. S. Smith.)
2	74892	Casco Bay, Maine, U. S. B. F, 104 B1	12.5 fms., 46.5°, m.
2	203059	Jewells Island, Casco Bay, Maine, U. S. B. F	
34	83441	Casco Bay, Maine	(Fuller.)
7	159704	Gulf of Maine, U. S. B. F. Station 21B	52-90 fms., 43°, rky.
12	74894	Gulf of Maine, U. S. B. F. Station 52B	27 fms., 42°, r. g.
9	74899	Gulf of Maine, U. S. B. F. Station 39	75 fms., 39°, s. m.
9	74888	Gulf of Maine, U. S. B. F. Station	
1	159705	Gulf of Maine, U. S. B. F. Station 13B	105.5 fms., 40°, br. m.
5	74891	Gulf of Maine, U. S. B. F. Station 33B	22 fms., 48.5°, hrd. rky.
4	159703	Gulf of Maine, U. S. B. F. Station 189	85 fms., 40°, g. p.
8	24628	Coast of Maine	(Stimpson.)
10	74895	Gulf of Maine, U. S. B. F. 55-6B	30-40 fms. 46°, g.
8	74896	Gulf of Maine, U. S. B. F. 66-7B	65-86 fms., 40°, br. m. g.
3	74893	Gulf of Maine, U. S. B. F. 46B	51 fms., 42°, hrd. s. m.
1	74890	Gulf of Maine, U. S. B. F. Station 29B	33 fms., 49°, g. st.
4	74907	Gulf of Maine, U. S. B. F. Station 140	38 fms., 40°, m.
5	74897	Gulf of Maine, U. S. B. F. Station 78B	35 fms., 43°, bu. c. m. s.
3	74900	Gulf of Maine, U. S. B. F. Station 47	59 fms., p. s.
1	74908	Massachusetts Bay, U. S. B. F Station 221	37-38 fms., 49.7°, fne. s. m.
4	83436	Massachusetts Bay	
2	50348	East of Georges Bank, U. S. B. F. Station 2524	85 fms., 42.6°, s. g. st.
1	314938	Gotts Island, Maine	10 fms., type, (J. B. Henderson).
10	34736	Georges Bank, U. S. B. F. Station 2065	80 fms., 44.5°, s. g. brk. sh.
1	50352	Southeast Georges Bank, U. S. B. F. Station 2530.	956 fms., 38.4°, gy. oz.
6	74881	Georges Bank, U. S. B. F. Station 82B	50 fms., 45°, s. sh.
4	74882	Georges Bank, U. S. B. F. Station 83B	60 fms., 58°, s. sh.
6	35090	Georges Bank, U. S. B. F. Station 2055	99.5 fms., bu. m. s. crs. g.
2	34958	Georges Bank	Do.
3	38147	Georges Bank, U. S. B. F. Station 2077	1255 fms., 39°, bu. m.
9	74878	Georges Bank, U. S. B. F. Station 96B	150 fms., 52°, sft. s. m.
7	38121	Georges Bank, U. S. B. F. Station 2072	858 fms., 39°, gy. m.
1	34971	Georges Bank, U. S. B. F. Station 2066	65 fms., 43.5° s. st. g.
45	50349	East of Georges Bank, U. S. B. F. Station 2525	72 fms., 43.6°, s. g. brk. sh.
4	213088	Georges Bank	110 fms. (Packard).
13	74884	La Havre Bank, U. S. B. F. Station 86B	45 fms., 36°, g. st.
4	74885	La Havre Bank, U. S. B. F. Station 87B	60 fms., g. st. spg.
20	50347	La Havre Bank, U. S. B. F. Station 2521	65 fms., 42.1°, sh. g.
2	74916	Cape Cod, U. S. B. F. Station 378	96 fms., 58°, br. m.
5	74911	Cape Cod, U. S. B. F. Station 305	118 fms., 41°, sft. br. m.
10	74909	Cape Cod, U. S. B. F. Station 266	120 fms., bu. m.
2	74913	Cape Cod, U. S. B. F. Station 344	130 fms., 41.8°, br. m.
2	74910	Cgpe Cod, U. S. B. F. Station 304	122 fms., 41°, sft. br. m.
3	74914	Cape Cod, U. S. B. F. Station 362	106 fms., gy. m.
4	40209	Nantucket Shoals, U. S. B. F. Station 2259	41 fms., 50.2°, gy. s. bk. sp.
46	38150	Off Nantucket Shoals, U. S. B. F. Station 2048	547 fms., 29°, crs. s. m. g.
3	38144	Off Nantucket Shoals, U. S. B. F. Station 2046	407 fms., 40°, bu. m.
1	74898	Off Block Island, U. S. B. F. Station 115-118	20-25 fms., 45°-47°, s. sh.
2	38602	Off Marthas Vineyard, U. S. B. F. Station 941	79 fms., 52°, hrd. s. m.
15	38602	Off Marthas Vineyard, U. S. B. F. Station 1095	321 fms., 40°, sft. gn. m.
1	38607	Off Marthas Vineyard, U. S. B. F. Station 951	225 fms., 41°, m.
13	38595	Off Marthas Vineyard, U. S. B. F. Station 894	365 fms., 40°, sft. br. m. sml. st
10	38621	Off Marthas Vineyard, U. S. B. F. Station 1096	317 fms., 40°, sft. gn. m.
4	73056	Off Marthas Vineyard, U. S. B. F. Station 2213	384 fms., 39.5° gn. m.
40	38594	Off Marthas Vineyard, U. S. B. F. Station 892	487 fms., sft. br. m. sml. st.
1	38596	Off Marthas Vineyard, U. S. B. F. Station 895	238 fms., 42°, sft. m.
1	38613	Off Marthas Vineyard, U. S. B. F. Station 1030	337 fms., 41°, yl. m,
13	38606	Off Marthas Vineyard, U. S. B. F. Station 949	100 fms., 52°, yl. m.
25	38619	Off Marthas Vineyard, U. S. B. F. Station 1093	349 fms., 40°, bu. m. s.
6	38632	Off Marthas Vineyard, U. S. B. F. Station 2183	195 fms., 44.5°, gr. m. s.
2	38622	Off Marthas Vineyard, U. S. B. F. Station 1097	158 fms., 45°, fne. s.
19	38617	Off Marthas Vineyard, U. S. B. F. Station 1038	146 fms., 47°, s. sh.
4	38614	Off Marthas Vineyard, U. S. B. F. Station 1031	255 fms., 46°, yl. m.
19	38627	Off Marthas Vineyard, U. S. B. F. Station 1143	452 fms., 40°, sft. m.
21	38605	Off Marthas Vineyard, U. S. B. F. Station 947	319 fms., 44°, s. m.
1	38598	Off Marthas Vineyard, U. S. B. F. Station 922	71 fms., 52°, gr. m. s.
1	38618	Off Marthas Vineyard, U. S. B. F. Station 1092	202 fms., 41°, gy. s.
1	38624	Off Marthgs Vineyard, U. S. B. F. Station 1113	192 fms., 43°, gr. m.
1	38600	Off Marthas Vineyard, U. S. B. F. Station 938	317 fms., 42°, gr. m. s.
51	38593	Off Marthas Vineyard, U. S. B. F. Station 891	480 fms,. sft. br. m.
3	38633	Off Marthas Vineyard, U. S. B. F. Station 2212	428 fms., 40°, gr. m.
2	38616	Off Marthas Vineyard, U. S. B. F. Station 1033	183 fms., s. g.
26	38626	Off Marthas Vineyard, U. S. B. F. Station 1142	322 fms., 41°, m. s. p.
1	38599	Off Marthas Vineyard, U. S. B. F. Station 925	229 fms., 42°, s. m.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	38604	Off Marthas Vineyard, U. S. B. F. Station 945	207 fms., 44°, gr. m. s.
5	103445	Off Marthas Vineyard, U. S. B. F. Station 2583	131 fms., 47.5°, gr. m. s.
8	38609	Off Marthas Vineyard, U. S. B. F. Station 997	335 fms., 40°, yl. m.
24	38625	Off Marthas Vineyard, U. S. B. F. Station 1140	374 fms., 40°, fne. s. sft. m. p.
8	38629	Off Marthas Vineyard, U. S. B. F. Station 1154	193 fms., s. m.
7	73057	Off Marthas Vineyard, U. S. B. F. Station 2214	475 fms., 39.5°, gr. m.
3	38591	Off Marthas Vineyard, U. S. B. F. Station 871	115 fms., 49°, m. fne. s.
5	38612	Off Marthas Vineyard, U. S. B. F. Station 1028	410 fms., 41°, yl. m.
1	38623	Off Marthas Vineyard, U. S. B. F. Station 1098	156 fms., 43.5°, fne. s.
1	38628	Off Marthas Vineyard, U. S. B. F. Station 1144	386 fms., 41°, sft. m.
2	38601	Off Marthas Vineyard, U. S. B. F. Station 939	264 fms., 47°, gr. m. s.
13	38615	Off Marthas Vineyard, U. S. B. F. Station 1032	208 fms., 46°, yl. m.
4	38630	Off Maryland, U. S. B. F. Station 2172	568 fms., 39°, gr. m.
2	38597	Off Chesapeake Bay, U. S. B. F. Station 898	300 fms., 44°, m.
5	35425	Off Cape Hatteras, U. S. B. F. Station 2109	142 fms., 50.5°, bu. m.
5	159698	Gulf of Maine, U. S. B. F. Station 4B	60 fms., 45°, br. m. s.
2	74927	Gulf of Maine, U. S. B. F. Station 54B	110 fms., 42°, m.
1	74930	Massachusetts Bay, U. S. B. F. Station 230	21 fms., 57°, r. fne. m. s.
1	74919	Georges Banks, U. S. B. F.	150 fms., 52°.
1	43829	Off Marthas Vineyard, U. S. B. F. Station 2241	50 fms., 51.4°, gn. m.

DENTALIUM (ANTALIS) AGILE SUBAGILE, new subspecies.

Plate 4, fig. 8.

1879. *Dentalium entalis orthrum* Watson, Journ. Linn. Soc. Zool., vol. 14, p. 512, in part.

1886. *Dentalium entalis orthrum* Watson, *Challenger* Report Scaphopoda, p. 6, in part.

1897. *Dentalium entalis orthrum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 44, in part.

1897. *Dentalium* (*Antalis*) *agile*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 46, in part (not pl. 8, fig. 36); (not *D. agile*, Dall, Bull. Mus. Comp. Zool., vol. 9, p. 37, 1881); (not *D. agile*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 418, 1889).

1901. *Dentalium agile*, Whiteaves, Cat. Marine Inv. of E. Canada, p. 152.

1908. *Dentalium agile*, Lermond, Shells of Maine, p. 15.

1915. *Dentalium agile*, Johnson, Occ. Papers, Boston Soc. Nat. Hist., No. 7, p. 83.

The shell is very long and slender; slowly and regularly increasing in diameter from tip to oral end; it is of moderate degree of curvature, pronounced in the tip. The degree of curvature is, however, a variable feature in this species, some specimens being nearly straight. It is of a dull ashy-white color and possesses a thin outer layer of varying degrees of hardness, covering a middle chalky-white layer, which in turn surrounds an inner hard but thin nacreous layer. The outer surface usually flakes off in spots and exposes the chalky texture underneath to the destructive action of the sea water. The sculpture consists of about 18 longitudinal, narrow riblets, separated by wider, rather smooth, shallow spaces between them. The riblets are not increased by intercalation, and continue, though gradually fading, to the aperture except in very old specimens. Between some of the primary ribs there may be occasionally detected some very fine longitudinal lines, which are, however, of minor importance, as they rarely persist. Coarse, irregular growth lines are more or less apparent over the entire shell. All sculptural features are confined to the outer shell layer and are more or less obliterated in most specimens.

The type, Cat. No. 50191 (*a*), U.S.N.M., was dredged at the U. S. B. F. Station 2513 between Halifax and Le Havre Bank, in 134 fathoms, bottom of gray ooze; temperature, 43.6° F. It measures—length, 62 mm.; diameter, 4.75 mm.; arc, 3.5.

Eight lots in the museum collection are all from off Nova Scotia in from 57 to 134 fathoms, with bottom temperatures ranging from 36° to 44° F. One of these measures—length, 88 mm.; diameter, mm.; arc, 5.

The tendency to abnormality in curvature and to other accidents of shape is very remarkable, so much so that a really normal shell is hard to select. Variance in the degree of curvature is unusual in the *Dentalia*—a fact which emphasizes this exception.

The absolute identity of this subspecies with Sars's typical *Dentalium agile* and Jeffreys's *D. abyssorum* of European waters will likely remain a question of individual opinion. The differences between these west and east Atlantic shells are much the same as those noted under *D. entale stimpsoni* (p. 35). When viewed in quantity there is no doubt of a difference. Selected specimens will reestablish an identity. In general the American shells, despite a softer and more chalky texture, possess a sharper sculpture, and the notable tendency to abnormality in shape and curvature is absent from east Atlantic forms. Doctor Dall's *D. agile oleacinum* of the Pliocene is a smooth sculptureless shell and not synonymous with *D. agile subagile*. Doctor Watson's *D. e. orthrum* is an east Atlantic subspecies, to which he referred specimens taken by the *Challenger* off Prince Edward Islands, in 140 fathoms. I have no doubt but that these shells should be referred to our *D. a. subagile*.

The following are the United States National Museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	50191a	Between Halifax and Le Havre Banks, U. S. B. F. Station 2513	134 fms., 44° gy. oz.
25	50191	Between Halifax and Le Havre Banks, U. S. B. F. Station 2513	134 fms., 44° gy. oz.
3	50188	Between Middle Ground and Halifax, U. S. B. F. Station 2505	93 fms., 42°, dk. br. m.
56	50189	Between Middle Ground and Halifax, U. S. B. F. Station 2506	127 fms., 43°, dk. br. m.
21	50192	Between Halifax and Le Havre Banks, U. S. B. F. Station 2514	126 fms., 43°, bk. m.
1	52302	Between Halifax and Le Havre Banks, U. S. B. F. Station 2512	103 fms., 43°, br. m.
1	50193	Le Havre Bank, U. S. B. F. Station 2515	57 fms., 36°, s. g.
2	314325	75 miles east Cape Sable, Nova Scotia, (F. W. Clapp, collector)	105 fms., m. (O. Bryant).

[1] Type.

DENTALIUM (ANTALIS) OCCIDENTALE Stimpson.

1841. *Dentalium dentale*, GOULD, Invert. Mass., p. 155, pl. 1, fig. 5 (not *D. dentalis* Linnaeus).
1851. *Dentalium occidentale* STIMPSON, Shells of New England, p. 28 (based upon Gould, no description).
1870. *Dentalium dentale*, GOULD (Binney Ed.), Invert. Mass., p. 266.
1874. *Dentalium occidentale*, SMITH and HARGAR, Trans. Conn. Acad. of Arts and Sci., vol. 3, pt. 1, p. 23.
1880. *Dentalium occidentale*, VERRILL, Proc. U. S. Nat. Mus., vol. 3, p. 394.
1880. *Dentalium occidentale*, VERRILL, Amer. Journ. Sci., ser. 3, vol. 20, No. 119, p. 392.
1882. *Dentalium occidentale*, VERRILL, Trans. Conn. Acad. of Arts and Sci., vol. 5, pl. 42, figs. 16–18.
1884. *Dentalium occidentale*, VERRILL, Trans. Conn. Acad. of Arts and Sci., vol. 6, pt. 1, p. 216.
1884. *Dentalium occidentale*, VERRILL, Rept. Comm. Fish and Fisheries for 1883, p. 573, pl. 28, figs. 123–125.
1884. *Dentalium occidentale*, BUSH, Rept. Comm. Fish and Fisheries for 1883, p. 717.
1893. *Dentalium occidentale*, BUSH, Bull. Museum of Comp. Zool., vol. 23, No. 6, p. 224.
1897. *Dentalium* (*Antalis*) *occidentale*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 47, pl. 9, figs. 41–43; pl. 13, figs. 9–11.
1901. *Dentalium occidentale*, WHITEAVES, Cat. Marine Invert. of E. Canada, p. 152.
1904. *Dentalium occidentale*, BLANEY, Proc. Boston Soc. Nat. Hist., vol. 32, No. 2, p. 30.
1908. *Dentalium occidentale*, LERMOND, Shells of Maine, p. 15.
1915. *Dentalium occidentale*, JOHNSON, Occ. Papers Boston Soc. Nat. Hist., vol. 7, p. 83.

The shell is moderately curved, chiefly in its posterior fourth, and increases regularly in diameter; the section is round. Some specimens show a slight dorsoventral compression in the middle posterior portion. Its color is of a dirty white, showing occasionally an ivory tinge; the surface is dull and lusterless. A thin outer layer, a central softer chalky layer, and an inner hard and compact bluish white layer, form the substance of the shell. The two outer layers are subject to erosion, in consequence of which the majority of living specimens present a patchy, worn appearance. The sculpture consists of 16 primary longitudinal, quite sharply defined, narrow rounded riblets, inclosing coarsely surfaced spaces between, of about equal or somewhat greater width than that of the riblets. These riblets are better developed upon the posterior portion, but in some well-preserved adult specimens they persist, though with decreasing definiteness, to the end. Some intercalation may be present. As these sculptural features are mostly confined to the outer shell layer, erosion often obliterates all but mere traces of them. There is an apical notch on the convex side, but this character is often obscure.

Length, 34 mm.; diameter, 3.75 mm.; arc, 2 (almost complete shell).

Length, 34 mm.; diameter, 4 mm.; arc, 1.75 (part of tip lost).

The type has not been preserved.

This is a cold-water species, closely related to *Dentalium entale*, *D. agile*, *D. abyssorum*, and their subspecies. It ranges from Newfoundland to off Hatteras, generally on the continental slope, well offshore, in depths from 20 to 1,000 fathoms. It is not usually found together or associated with *D. entale stimpsoni*, from which it differs by its sculpture, its more slender form, and by its even increase in diameter. From *D. a. subagile* it differs chiefly in the smaller size and in its regular curvature.

Two subspecies may be recognized.

DENTALIUM (ANTALIS) OCCIDENTALE OCCIDENTALE Stimpson.

Plate 4, figs. 1, 5, 6, 7, 9.

This subspecies includes all the specimens answering the general description just given under *D. occidentale* except the group of thinner, more prominently sculptured forms, which will be considered in the next following heading as a distinct subspecies. This typical subspecies is characterized by the thin outer shell layer, or periostricum, overlying the midlayer of softer chalky nature and the resultant decrease in the definiteness of all its sculptural features. It is the usual common form of the species.

Measurements and depth range and geographic distribution are the same as for *D. occidentale*.

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	83433	Gulf of St. Lawrence	(Whiteaves).
1	50190	Between Halifax and La Havre Bank, U. S. B. F. 2512.	103 fms., 43°, br. m.
1	74904	Off Nova Scotia, U. S. B. F. Station 8506	101 fms., 38°.
3	77311	Gulf of Maine, U. S. B. F. Station 176	175 fms., 38°, m.
3	77310	Gulf of Maine, U. S. B. F. Station 175	144 fms., m.
1	74922	Gulf of Maine, U. S. B. F. Station 12B	60 fms., 42°, br. m.
1	74924	Gulf of Maine, U. S. B. F. Station 143 B1	64 fms., 36°, m.
13	74920	Gulf of Maine, U. S. B. F. Station 37B	117 fms., sft. bu. m.
1	74920	Gulf of Maine, U. S. B. F. Station 37B	117 fms., sft. bu. m.
1	77309	Gulf of Maine, U. S. B. F. Station 174	140 fms., 39°, m.
2	74926	Gulf of Maine, U. S. B. F. Station 51 and 73B	105–102 fms., 41°, m. g.
1	159700	Gulf of Maine, U. S. B. F. Station 13B	105.5 fms., 40°, br. m.
10	74934	Off Cape Cod, U. S. B. F. Station 305	118 fms., 41°, sft. br. m.
3	74931	Off Cape Cod, U. S. B. F. Station 266	120 fms., bu. m.
1	74936	Off Cape Cod, U. S. B. F. Station 362	106 fms., gy. m.
2	50195	Southeast Georges Bank, U. S. B. F. Station 2529	662 fms., 39°, gy. m.
2	52085	Southeast Georges Bank, U. S. B. F. Station 2571	1,356 fms., 38°, gy. glob. oz.
1	50196	Southeast Georges Bank, U. S. B. F. Station 2530	956 fms., 38°, gy. oz.
1	74917	Georges Bank, U. S. B. F. Station 85 B	430 fms., 51°, S. g. st.
1	50195	Georges Bank, U. S. B. F. Station 2529	662 fms., 39°, gy. m.
2	43720	Off Nantucket Shoals, U. S. B. F. Station 2217	924 fms., 38°, gy. m.
7	78224	Southeast Nantucket, U. S. B. F. Station 2710	984 fms., gr. m.
11	40326	Off Nantucket Shoals, U. S. B. F. Station 2262	250 fms., 41 gr. m. s.
5	78219	South of Nantucket, U. S. B. F. Station 2682	1,004 fms., s. gr. m.
4	159701	Off Nantucket Shoals, U. S. B. F. Station 2048	547 fms., crs. s. m. g.
26	78046	South of Nantucket, U. S. B. F. Station 2681	990 fms., gn. m.
8	78224	Southeast of Nantucket, U. S. B. F. Station 2710	984 fms., gn. m.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	50198	Off Nantucket, U. S. B. F. Station 2533	828 fms., br. oz., 38.7°.
1	43717	South of Block Island, U. S. B. F. Station 2207	1,061 fms., 38°, gn. m.
12	78220	South of Block Island, U. S. B. F. Station 2689	525 fms., gn. m.
2	43714	South of Block Island, U. S. B. F. Station 2202	515 fms., 39°, gn. m.
3	314326	South of Block Island, U. S. B. F. Station 2213	384 fms., 39.5°, gn. m.
11	159699	Noank, Conn., U. S. B. F. Station 442	14 fms., 64°, st. g.
5	38571	Off Marthas Vineyard, U. S. B. F. Station 947	319 fms., 44°, s. m.
6	38564	Off Marthas Vineyard, U. S. B. F. Station 895	238 fms., 42°, sft. m.
5	38584	Off Marthas Vineyard, U. S. B. F. Station 1096	317 fms., 40°, sft. gn. m.
4	43713	Off Marthas Vineyard, U. S. B. F. Station 2183	195 fms., 44°, gn. m. s.
2	38556	Off Marthas Vineyard, U. S. B. F. Station 870	155 fms., m. fne. s.
1	38579	Off Marthas Vineyard, U. S. B. F. Station 1032	208 fms., 46°, yl. m.
3	38566	Off Marthas Vineyard, U. S. B. F. Station 938	317 fms., 42°, gn. m. s.
11	43718	Off Marthas Vineyard, U. S. B. F. Station 2212	428 fms., 40°, gn. m.
17	38575	Off Marthas Vineyard, U. S. B. F. Station 998	302 fms., 40°. gn. m.
5	....	Off Marthas Vineyard, U. S. B. F. Station 998	302 fms., 40°, gn. m.
14	103440	Off Marthas Vineyard, U. S. B. F. Station 2583	131 fms., 47.5°, gn. m. s.
6	38564	Off Marthas Vineyard, U. S. B. F. Station 895	238 fms., 42°, sft. m.
31	53033	Off Marthas Vineyard, U. S. B. F. Station 2586	328 fms., 40.2°, dk, gy. m.
9	38563	Off Marthas Vineyard, U. S. B. F. Station 894	365 fms., 40°, sft. br. m. sml. st.
30	50999	Off Marthas Vineyard, U. S. B. F. Station 2547	390 fms., 40°, gn. m.
1	38557	Off Marthas Vineyard, U. S. B. F. Station 871	115 fms., 49°, m. fne. s.
1	74938	Off Marthas Vineyard. U. S. B. F. Station 985	26 fms., 50°, s.
1	38569	Off Marthas Vineyard, U. S. B. F. Station 943	157 fms., 49°, m. s. sh.
13	53055	Off Marthas Vineyard, U. S. B. F. Station 2582	137 fms., 47.2°, gn. m.
26	43719	Off Marthas Vineyard, U. S. B. F. Station 2213	384 fms., 39.5°, gn. m.
12	38561	Off Marthas Vineyard, U. S. B. F. Station 891	480 fms., sft. br. m.
6	38578	Off Marthas Vineyard, U. S. B. F. Station 1028	410 fms., 41°, yl. m.
1	38567	Off Marthas Vineyard, U. S. B. F. Station 939	264 fms., 47°, gn. m. s.
23	77313	Off Marthas Vineyard, U. S. B. F. Station 997	335 fms., 40°, yl. m.
3	53130	Off Marthas Vineyard, U. S. B. F. Station 2588	479 fms., 39.5°, gn. m.
2	38558	Off Marthas Vineyard, U. S. B. F. Station 876	120 fms., 53°, sft. stk. m.
12	38561	Off Marthas Vineyard, U. S. B. F. Station 891	480 fms., sft. br. m.
1	38589	Off Marthas Vineyard, U. S. B. F. Station 869	192 fms., 50°, fne. s.
66	38562	Off Marthas Vineyard, U. S. B. F. Station 892	487 fms., sft. br. m. sml. st.
66	53109	Off Marthas Vineyard, U. S. B. F. Station 2584	541 fms., 40°, gn. m.
30	38582	Off Marthas Vineyard, U. S. B. F. Station 1093	349 fms., 40°, m. s.
7	38585	Off Marthas Vineyard, U. S. B. F. Station 1142	322 fms., 41°, m. s. p.
2	38560	Off Marthas Vineyard, U. S. B. F. Station 880	252 fms., 43°, m.
3	38555	Off Marthas Vineyard, U. S. B. F. Station 869	192 fms., 50°, fne. s.
2	38588	Off Marthas Vineyard, U. S. B. F. Station 1154	193 fms., s. m.
3	38572	Off Marthas Vineyard, U. S. B. F. Station 949	100 fms., 52°, yl. m.
31	38583	Off Marthas Vineyard, U. S. B. F. Station 1095	321 fms., 40°, sft. gn. m.
22	38586	Off Marthas Vineyard, U. S. B. F. Station 1143	452 fms., 40°, sft. m.
21	38592	Off Marthas Vineyard, U. S. B. F. Station 941	79 fms., 52°, hrd. s. m.
2	38568	Off Marthas Vineyard, U. S. B. F. Station 1143	452 fms., 40°, sft. m.
5	151912	Off Marthas Vineyard, U. S. B. F. Station 2547	390 fms., 40°, gn. m.
1	74937	Off Marthas Vineyard, U. S. B. F. Station 869	192 fms., fne. s.
11	38576	Off Marthas Vineyard, U. S. B. F. Station 999	266 fms., gn. m.
2	38587	Off Marthas Vineyard, U. S. B. F. Station 1144	386 fms., 41°, sft. m.
19	43722	South of Long Island, U. S. B. F. Station 2234	810 fms., 39°, gn. m.
1	40240	South of Long Island, U. S. B. F. Station 2235	707 fms., 38.8°, gn. m.
5	43712	South of Long Island, U. S. B. F. Station 2176	302 fms., 41°, bk. m.
2	76830	Southeast of Delaware Bay U. S. B. F. Station 2742.	865 fms., 37°, gn. m.
27	76831	110 miles southeast of Delaware Bay, U. S. B. F. Station 2739.	811 fms., 38.2°, gn. m.
2	314327	Off Delaware Bay, U. S. B. F. Station 2237	520 fms., gn. m., 39.5°.
31	43710	Off Maryland, U. S. B. F. Station 2171	444 fms., 39.5°, gn. m.
17	43711	Off Maryland, U. S. B. F. Station 2172	568 fms., 39°, gn. m.
1	78906	125 miles east of Chesapeake, U. S. B. F. Station 2723.	1,685 fms., gy. oz. for.
1	38127	Off Virginia, U. S. B. F. Station 2003	641 fms.
6	314328	Off Virginia, U. S. B. F. Station 2731	781 fms., gy. oz.
1	314329	Off Virginia, U. S. B. F. Station 2172	568 fms., gn. m.
20	35624	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2115.	843 fms., 39°, m. fne. s.
2	38124	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2109.	142 fms., 50.5°, bu. m.
19	74932	Cape Cod, U. S. B. F. Station 267	135 fms., 41°, bu. m.
5	74933	Cape Cod, U. S. B. F. Station 304	122 fms., 41°, sft. br. m.
9	38581	Cape Cod, U. S. B. F. Station 1090	110 fms., 38.5°, gy. m.
6	38577	Off Marthas Vineyard, U. S. B. F. Station 1025	216 fms., 45°, gn. m.

DENTALIUM (ANTALIS) OCCIDENTALE GEORGIENSE, new name.

Plate 5, fig. 5.

1884. *Dentalium occidentalis sulcatum* Verrill, Trans. Conn. Acad. of Arts and Sci., vol. 6, p. 217 (not of Lamarck, 1818, nor of Sacchi).
1884. *Dentalium occidentalis sulcatum* Verrill, Report of Com. of Fish and Fisheries for 1883, p. 573.
1897. *Dentalium occidentalis sulcatum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 48.
1915. *Dentalium occidentalis sulcatum*, Johnson, Occ. Papers Boston Soc. Nat. Hist., vol. 7, p. 83.

This is a form characterized by a greater definiteness of sculpture upon the shell and which assumes the importance of very well marked riblets, with concave grooves between, and further having its sculptural features extend through to the interior of the shell. This is owing to a lesser thickness of its middle or chalky layer. The shells are of a thinner, harder texture, and therefore resist erosion. It is connected with the typical subspecies by intermediates. Verrill's type is not in the museum collection, but there are five lots from his hands from off Georges Bank, and off Marthas Vineyard. One lot from off Marthas Vineyard in 67 fathoms is the least recorded depth.

The specimen figured on plate 5 is from a lot of two examples, Cat. No. 52742, U.S.N.M., dredged by the *Albatross* at the U. S. B. F. Station 2582, off Marthas Vineyard, in 137 fathoms, green mud, bottom temperature 47.2°. It measures—length, 29 mm.; diameter, 3.5 mm.; arc, 2.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	35093	Georges Banks, U. S. F. C. Station 2077	1,255 fms., 39°, bu. m.
1	83434	Massachusetts Bay	
2	52742	Off Marthas Vineyard, U. S. F. C. Station 2582	137 fms., 47.2°, gn. m.
1	92825	South of Marthas Vineyard, U. S. F. C. Station 2244.	67 fms., 52.9°, gn. m.
2	52311	Off Marthas Vineyard, U. S. F. C. Station 2584	541 fms., 40°, gn. m.
1	78225	South of Nantucket, U. S. F. C Station 2682	1,004 fms., gn. m. s.
1	43972	Off Chesapeake Bay, U. S. F. C. Station 2263	430 fms., gn. m.
5	94292	Off Cape Hatteras, Blake Station 35	300 fms., gn. m. (Rush).

KEY TO GROUP OF DENTALIUM ANTILLARUM.

Shell with nine primary ribs.
  Color plan of translucent spots present.
    Microscopic sculpture present.................*Dentalium antillarum*, page 44.
  Color plan of translucent spots absent.
    Microscopic sculpture absent..................*D. pseudohexagonum*, page 46.

DENTALIUM (ANTALIS) ANTILLARUM Orbigny.

Plate 5, figs. 1, 2, 3, 4, 6, 7, 8.

1846. *Dentalium antillarum* Orbigny, Moll. Cuba, vol. 2, p. 202, pl. 25, figs. 10–13.

1887 (?). *Dentalium antillarum*, Simpson, Proc. Dav. Acad. Sci., vol. 5, p. 70.

1897. *Dentalium* (*Antalis*) *antillarum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 57, pl. 14, figs. 22–25 (also probably figs. 16, 17, 18, 20, 21). In part. [Not *D. antillarum*, Dall, Bull. Mus. Comp. Zool., vol. 9, p. 37 (1881) nor Dall, Bull. Mus. Comp. Zool., vol. 18, p. 421 (1889) nor Dall, Bull. 37, U. S. Nat. Mus., p. 76 (1889 and 1903), all of which are *Dentalium bartletti*.]

1901(?). *Dentalium antillarum*, Dall and Simpson, U. S. Fish Com. Bulletin for 1900, vol. 1, p. 456. [Not *D. antillarum*, Dall in Nat. Hist. Bull., State Univ. Iowa (1896), vol. 4, No. 1, p. 20.]

The shell is small, moderately curved, with its greatest curvature in the extreme posterior position. The apex is rather blunt as it quickly increases in diameter, but thereafter the shell exhibits an even regular slow increase. The tip is sharp, slender, and strongly curved, but it is very rarely retained. The surface is of an opaque white color and sometimes reflects a greenish tint, and is always encircled more or less distinctly by bands of translucent gray, observable usually as translucent spots on the ribs. This is a very characteristic feature, and is never wholly absent in fresh specimens. The texture of the shell is hard, compact, and porcellanous, but not shining. The sculpture consists of nine primary ribs, which are almost at once increased by intercalation to 12. They may be either well elevated or decidedly flattened, at first separating spaces of double their own width; further intercalation of a secondary rib between each primary soon takes place, thereby doubling the original number and causing the ribs and the intercostal spaces to assume about equal widths. The intercalated ribs attain equal importance with the original ones, and all continue, though with decreasing distinctness in senile specimens, to the anterior aperture. In some specimens, however, but little intercalation takes place, the primaries continuing alone to the maturer stages of the shell, when some lesser secondary ribs usually appear. In such forms the primary ribs seem more prominent, especially if they are not flattened, and thus impart to the shell a somewhat different aspect. A further sculptural feature is a system of exceedingly fine transverse lirae within the intercostal spaces, which vary in degree from mere growth lines in some specimens to clearly defined lirae in others. A wide shallow apical notch on the convex, or more rarely on a curved side, is present.

Average specimens measure:

Length, 22 mm.; diameter, 2.1 mm.; arc, 2 (tip intact).

Length, 27 mm.; diameter, 2.5 mm.; arc, 1.75 (tip gone).

As appears in the description, and as might be expected in a shallow-water species of wide distribution, there is here a considerable range of variation, except only in the degree of curvature and in the general shape of the shell. These variations appear in the amount of prominence of the intercostal transverse sculpture. In the majority of specimens observed the longitudinal ribs are flat on top and are of about the same width as the spaces between them. Another form, which is mostly Cuban, has sharper, narrower ribs and shows but little intercalation. Another, which is also chiefly Cuban, has the number of its ribs increased by a double system of intercalation, and all the ribs so greatly widened and flattened that the spaces between are reduced to mere threads. This is the usual form that is found in Habana and Bahia Honda Harbors, though it is not confined to those two localities. In some forms the nine primary ribs are not clearly observable, owing to their almost immediate increase by intercalated secondaries even upon the slender tips, and as the tips are seldom preserved the shell appears to possess more than nine original ribs. The varying degree of intercalation, therefore, makes the actual number of ribs exceedingly inconstant. The curious maculation of the ribs, however, as already stated, is a constant and most striking feature.

The protean character of this species at first led me to divide it into several subspecies, but my divisions always became hopelessly confused by intermediates, and furthermore refused to conform with any distributional principles. I abandoned all attempts to subdivide the variable assemblage here included under Orbigny's meager description. This is the result of a long, patient study of the abundant material at my disposal.

Extreme forms of this species closely resemble the stouter forms of *Dentalium ceratum*, but may be distinguished by their greater curvature, their greater diameter and thickness in the apical portion, their less smooth and glossy surface in the anterior portion, and by the persistent gray color spots on the ribs. Worn fragments of the middle portion of the shell are often quite indistinguishable from *D. ceratum*.

Topotypes, Cat. No. 250089, U.S.N.M., are in the museum collection from St. Thomas. Lots from the Florida Keys, Tortugas (*Eolis*), northwest coast of Cuba, from Esperanza and Cape San Antonio (Barrera Expedition), Habana, Bahia Honda, Cardinas (Barrera Expedition), Bimini Islands (*Eolis*), Samana Bay, Barbados, are all littoral.

This is the most common shallow-water West Indian *Dentalium*, ranging from Barbados throughout the Lesser Antilles, Santo Domingo, Cuba, Florida, Bahamas, All the deep-water records for this species quoted by authors should be regarded as erroneous and as probably referring to other species confused with *D. antillarum*.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
11	250089	St. Thomas	(M. Petit) topotype.
2	314331	Miami, *Eolis* Station. 70	10 fms.
1	314330	Miami, *Eolis* Station 117	35–38 fms.
7	314332	Fowey Light, *Eolis* Station 88	6 fms.
3	314334	Caesars Creek Bank, *Eolis* Station 40	10 fms.
8	314333	Hawk Channel, *Eolis* Station 66	3–4 fms.
1	194635		
1	314338	Key West (inside reef), *Eolis* Station 75	5 fms.
3	53905	Key West (inside reef)	(Hemphill.)
4	314340	Tortugas, *Eolis* Station 34	14 fms.
12	314339	Tortugas, *Eolis* Station 33	16 fms.
14	314335	5 miles off entrance Key West, *Eolis* Station 30	7 fms.
3	314337	Key West (Gulf), *Eolis* Station 102	9 fms.
4	314336	Smith's Shoal, Key West, *Eolis* Station 335	
8	194634	West coast of Florida, U. S. F. C. Station 7106	12½ fms., 63°.
9	194902	do	10–12 fms. (Benedict).
2	95323	Bahamas	(Rawson.)
4	314341	South Bimini Island, *Eolis* Station 74	Shore drift.
2	251378	Bahamas, Mrs. Porter	
3	314344	Cayo Levisa, Cuba, *Eolis* Station 201	
1	314350	Cochinos Bay, Cuba, *Eolis* Station 17	
5	314338	Cabanas Harbor, Cuba, *Eolis* Station 202	
9	95324	Camana Bay, Santo Domingo	16 fms. (Couthouy).
5	314842	Antigua, Falmouth Harbor	
2	19731	Barbados, S. U. I. 410	
2	314843	Antigua, English Harbor, S. U. I. 401	
23	314342	Cape Cajon, Cuba, *Barrera* Station 211	
9	314343	Esperanza, Cuba, *Barrera* Station 210	2–3 fms.
6	314345	Cayo Arenas, Cuba, *Barrera* Station 206	
5	314347	Cabanos Harbor, Cuba, *Barrera* Station 208	1–12 fms.
120	314356	Cardenas Bay, Cuba, *Barrera* Station 212	1–3 fms.
1	314349	do	Do.
7	314374	Hawk Channel, Florida, *Eolis* Station 66	3–4 fms.
2	314380	East of Cape Sable, Florida, *Eolis* Station 4	1½ fms.
2	314361	Esperanza, Cuba, *Barrera* Station 210	2–3 fms.
13	314352	Cape Cajon, Cuba, *Barrera* Station 211	
8	314360	Bahia Honda, Cuba, *Barrera* Station 208	1–12 fms.
4	314355	Punta Tolete, Cuba, *Barrera* Station 205	2–3 fms.
4	314353	Cabanas Harbor, Cuba, *Barrera* Station 203	3–12 fms
1	314354	Punta Colorado, Cuba, *Barrera* Station 207	2–3 fms.
5	314358	Santa Lucia, Cuba, *Barrera* Station 200	2–4 fms.
6	314359	Cayo Levisa, Cuba, *Barrera* Station 201	
53	314357	Santa Rosa, Cuba, *Barrera* Station 209	3–6 fms.
2	314351	South Cat Cay, Bahamas, *Eolis* Station 47	3 fms.
83	314373	Caesars Creek, Florida, *Eolis* Station 40	10 feet.
1	314366	Miami, Florida, *Eolis* Station 83	3 fms.
1	314367	Miami, Florida, *Eolis* Station 113	18–20 fms.
1	314368	Miami, Florida, *Eolis* Station 114	20 fms.
6	314369	Miami, Florida, *Eolis* Station 62	Do.
1	314370	Miami, Florida, *Eolis* Station 93	18–25 fms.
1	314371	Miami, Florida, *Eolis* Station 77	8 fms.
42	314372	1 mile southeast of Fowey Light, *Eolis* Station 8	25 fms.
2	314375	Inside Ajax Reef, *Eolis* Station 55	4 fms.
1	314376	Key West (reef), *Eolis* Station 73	
1	314378	Key West (reef), *Eolis* Station 71	4½ fms.
3	314379	Tortugas, *Eolis* Station 33	16 fms.
1	214340	Charlotte Harbor	(Dall.)
1	314377	Key West (Hawk Channel), *Eolis* Station 65	3–20 feet.
7	314381	Bimini Island, Bahamas, *Eolis* Station 50	20 fms.

DENTALIUM (ANTALIS) PSEUDOHEXAGONUM Ihering.

Plate 6, figs. 1, 2, 3.

Dentalium pseudohexagonum Ihering. (Reference not available.)

This is a species, the shell of which is characterized by nine primary, well-elevated narrow rounded ribs, not at once increased by secondaries on the tip, and which are separated by wider flat spaces between them. The intercostal spaces are crossed by coarse, rather widely spaced growth lines, which in the posterior portion of the shell become more prominent. The intercalation of one rounded secondary rib in each space usually occurs, but the secondary ribs never assume quite the importance of the primaries; all the ribs lose definiteness toward the anterior end of the shell. There are no color features. The shell is more regularly tapering and regularly curved than is *Dentalium antillarum*. None of the museum specimens show an apical notch.

Length, 20 mm.; diameter, 2 mm.; arc 1.5 (juvenile), Brazil.

Length, 23.75 mm.; diameter, 2 mm.; arc 1.5 (no tip), Tampa.

Length, 32 mm.; diameter, 5 mm.; arc 2 (no tip), Sanibel Island, Florida.

This is an example of the Brazil-Gulf of Mexico distribution. It belongs to the littoral zone. Though closely allied to the widely distributed *Dentalium antillarum*, it must not, on the other hand, be confused with the hexagonal *D. disparile*, of similar geographic range, and which it superficially resembles.

I am unable to find Doctor Ihering's description of this species, but have based my diagnosis upon a specimen from Ihering himself, probably a topotype from his original lot. As remarked, the species is closely related to *D. antillarum* in its general appearance, but it lacks the translucent spots and the microscopic transverse intercostal sculpture, in place of which are coarsely raised growth lines. The Florida lots here referred to average a trifle larger than Ihering's specimen, but are certainly conspecific. Both the primary and secondary ribbing of these are coarser and more prominent than in *D. antillarum* and the strong curve in the tip is lacking.

The museum records are set forth in the following table:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	225817	Brazil	(Ihering) author's specimen.
3	53906	Marco, Florida	2 fms. (Hemphill).
3	83783	Charlotte Harbor, Florida	(Dall).
3	61018	Tampa Bay, Florida	5 fms. (Simpson).
4	53904	Cape Romain, Florida (Stearns collection)	(Jewett).
3	53907	Florida	(Hemphill).
3	225015	Port Tampa, Florida, U. S. B. F.	4 fms. Sand.
18	228738	Sanibel Island	(W. F. Clapp).

DENTALIUM (ANTALIS) DISPARILE Orbigny.

Plate 6, figs. 4, 5, 6, 7, 8.

1846. *Dentalium disparile* Orbigny, Moll. Cuba, vol. 2, p. 202, pl. 25, figs. 14-17

1878 (?). *Dentalium disparile*, Arango, Contrib. Fauna Cubana, p. 232.

1892 (?). *Dentalium disparile*, Dall, Trans. Wagner Free Inst., vol. 3, p. 440.

1897. *Dentalium disparile*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17 p. 56, in part, pl. 14, fig. 19 (figs. 16, 17, 18, 20, and 21 are probably *antillarum*). [1881 Not Dall, Bull. Mus. Comp. Zool., vol. 9, p. 37.] [1889 Not Dall, Bull. Mus. Comp. Zool., vol. 18, p. 424.]

The shell is moderately and rather evenly curved, the curvature not being restricted to the apical portion; the tip is hexagonal, long and slender; the diameter of the shell increases regularly; it is thin but strong and of an opaque white, the surface being porcellanous and without translucent spots or bands. The six angles of the apex, with concave spaces between, become six primary narrow rod like ribs, with separating smooth flat spaces. The ribs become so disposed as to leave two broader intercostal spaces on the concave and three narrower spaces on the convex side, one of the ribs being about median on the concave side. Intercalation of secondary longitudinal ribs begins earlier or nearer the apex in the three convex side intercostal spaces than it does in the two concave side spaces, and is again followed later by still further intercalation; whereas in the two concave spaces the increase in the intercalated ribbing is much less, so that at the aperture, except in very senile specimens, the two concave spaces still preserve their definite outline, despite their acquisition of some intercalated ribs. The intercalated or secondary ribs on the convex side assume equal importance with the primaries, but all diminish toward the anterior end, though not losing their identity even in adult shells. There is no transverse sculpture discernible, but rather widely spaced growth lines may be seen with a lens. No apical notch or slit can be detected in any museum specimens.

Length, 14 mm. (Orbigny).

Length, 32 mm.; diameter, 3.4 mm.; arc, 2.1 (most of tip present), Rio de Janeiro.

Length, 33 mm.; diameter, 3.5 mm.; arc, 1.75 (tip gone), Rio de Janeiro.

Length, 26.5 mm.; diameter, 2.9 mm.; arc, 1 (most of tip present, Tampa, Florida.

No topotypes (Martinique) are in the museum collection, but lots from Rio San Sebastian, Brazil, and from Tampa, Florida, are quite typical. One senile specimen from Sabanilla becomes smooth in the anterior third of shell, the ribs quickly degenerating.

Further records from the Philadelphia Academy collection are Porto Barrios and Livingston, Guatemala; Belize Harbor; Roseau and Dominica.

The widely separated geographical records of Brazil and west Florida are not infrequently repeated in other species of mollusks and have already been commented upon under *Dentalium texasianum* and *D. pseudohexagonum*. Were our collection better supplied with shallow-water records from the Caribbean shore of South America and Central America and to Texas, a chain of connections would no doubt be established, particularly in view of the fact that ocean currents favor such distribution. The species also extends northward into the Lesser Antilles as far as Martinique, but seems not to be known from the Greater Antilles, the east coast of Florida, or Hatteras. It is apparently confined to the littoral zone.

Most commentators appear to have fallen into some error in the consideration of this species, generally confusing it with *Dentalium antillarum*. Orbigny's description is short and leaves much to be desired, but his figure, though of a juvenile specimen, is excellent. It is less closely related to *D. antillarum* than it is to *D. texasianum* and to a Pliocene group represented by *D. coloosaense* Dall, *D. prisma* Dall, and *D. octocostellatus* Pilsbry and Sharp. It might with equal propriety be placed under *Dentalium* s. s.

The following are the five records in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	61018a	Tampa Bay, Florida	(Simpson).
1	93833	Sabanilla, West Indies	Shore (Hering).
2	225819	San Sebastian, Brazil	
2	150784	do	
3	18711	Rio Janerio	United States Exploring Expedition.

KEY TO THE GROUP OF DENTALIUM CERATUM.

- Tip 9 angled.
  - Smooth posterior portion produced.
    - No intercalation on tip........ *Dentalium ceratum ceratum*, page 50.
    - Intercalation on tip (to 12 or 14).
      - Color yellow.
        - Diameter of 2 mm. (Florida)........ *D. ceratum flavum*, page 51.
        - Diameter of less than 2 mm. (Barbados).. *D. ceratum tenax*, page 52.
  - Smooth posterior portion not produced.
    - Color green........ *D. taphrium*, page 53.

DENTALIUM (ANTALIS) CERATUM Dall.

1881. *Dentalium ceratum* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 38.

1889. *Dentalium ceratum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 424, pl. 26, fig. 5; pl. 27, fig. 2.

1889. *Dentalium ceratum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 5.

1897. *Dentalium ceratum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 57, pl. 7, figs. 4, 5.

1903. *Dentalium ceratum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 5.

The shell is awl-shaped, with the chief curvature in the tip or extreme posterior portion, the balance of the shell having a relatively small arc. In color it is of a waxen yellow ranging from a brilliant yellow in some specimens, especially in the posterior half, to a pale yellowish tint becoming white in the anterior half of the shell. The texture of the shell is glassy, with a polished shining surface. The tip is nine ("seven") angled in section. The angles forming nine primary rodlike riblets narrow and sharply defined and separated by wide flat intercostal spaces. These primary riblets may continue for some distance without the intercalation of any secondaries, to be eventually supplemented, however, by a few secondaries, or intercalation may take place very early, even upon the tip, doubling the original nine riblets in number. The secondary riblets assume about equal prominence with the primaries, but at the beginning of the middle third portion of the shell all the sculptural features become fainter, and finally disappear entirely, leaving the second or anterior half of the shell perfectly smooth. An intercostal microscopic reticulation exists, formed by 15 to 20 minute longitudinals crossed by equally minute transverse lines, making a delicate network of exquisite finish. This feature persists only to where the primary riblets dissolve into the smooth polished cylinder. There is no very definite apical notch or slit observable, but a trace of such is indicated in a few tips on the convex side.

Length, 30 mm.; diameter, 2 mm. (type).

Length, 32 mm.; diameter, 2 mm.; arc, 2 (off Habana).

Length, 56 mm., diameter, 2.5 mm.; arc, 1.5 (tip gone) (off Habana). This giant specimen has the anterior three-fourths portion smooth.

Specimens average about 25 mm. in length. After the senile stage is reached, growth thereafter becomes a variable feature. An average shows in a length of 25 mm., one-third portion of shell ribbed and the remaining two-thirds smooth.

The type, Cat. No. 95326, U.S.N.M., was obtained by the *Blake* at U. S. B. F. Station 2 off Habana, in 805 fathoms, bottom temperature 39.75° F.

There is some variation in the number of riblets in this species, but there is no variation in the original number. The yellow color is very characteristic, but is not always preserved in dead shells, and probably wholly fades in time from specimens collected alive and in perfect condition. From the museum records it appears to be a species of the Antillean continental slope, though occupying a shallower zone on the edge of the Gulf Stream off the Florida Keys.

The variants are indicated in the following two subspecies described in more detail.

DENTALIUM (ANTALIS) CERATUM CERATUM Dall.

Plate 7, figs. 2, 4, 5, 6, 7.

The typical subspecies is restricted to those forms in which the nine primary riblets are not at once increased by the intercalation of secondary riblets. Such additions are but few; generally less than nine. In this respect only may *Dentalium ceratum ceratum* be distinguished from the other subspecies enumerated. The type, Cat. No. 95326, U.S.N.M., is the same as given for *D. ceratum*. The geographical range also remains the same.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	314382	Southeast of Sand Key, Florida, *Eolis* Station 6	35 fms., s. brk. sh.
1	314383	Off Sand Key, Florida, *Eolis* Station 327	85 fms.
2	314384	Off Sand Key, Florida, *Eolis* Station 100	65 fms.
1	314385	Off Sand Key, Florida, *Eolis* Station 300	72 fms.
5	314386	Off Sand Key, Florida, *Eolis* Station 338	85 fms.
4	314387	Off Sand Key, Florida, *Eolis* Station 326	75 fms.
1	314388	Off Sand Key, Florida, *Eolis* Station 3	69 fms., s. brk. sh.
3	314389	Key West, Florida, *Eolis* Station 63	78 fms.
2	314390	Off Western Dry Rocks, *Eolis* Station 319	90 fms.
2	323958	Off San Blas, U. S. B. F. Station 2404	60 fms., gy. s.
1	62651	Off Mouth Mississippi River, *Blake* Station 47	321 fms., 46.75°.
[1] 4	95326	Off Habana, Cuba, *Blake* Station 2	805 fms., 39.75°.
1	95329	Off Habana, Cuba, *Blake* Station 57	177 fms.
2	95328	Off Morro Light, Habana, *Blake* Station 101	200 fms.
1	95370	Off Morro Light, Habana, *Blake* Station 100	400 fms.
1	94107	South of Cuba, U. S. F. C. Station 2135	250 fms., hrd. C.
2	95327	Yucatan Bank, *Blake* Station 36	84 fms.
2	161571	Mayaguez, Porto Rico, U. S. B. F. Station 6067	97 fms.
1	108164	Off Fernandina, Florida, U. S. B. F. Station 2668.	294 fms., 46.3°, gy. s., dd. co.
11	314892	Antigua, off English Harbor, S. U. I. Experiment Station 115.	120 fms.
3	314893	Barbados, S. U. I. Expedition Station 48	80 fms.
1	314894	Barbados, S. U. I. Expedition Station 67	50-60 fms.
1	314895	Barbados, S. U. I. Expedition Station 13	80 fms.
1	314896	Barbados, S. U. I. Expedition Station (?)	Deep.
1	314897	Barbados, S. U. I. Expedition Station 10	100 fms.

[1] Type..

DENTALIUM (ANTALIS) CERATUM FLAVUM, new subspecies.

Plate 7, fig. 1.

The shell, like the typical subspecies, is awl-shaped, slightly curved, chief curvature being in the extreme posterior portion; the tip is very short, rapidly increasing in diameter and giving a thickened appearance to the posterior portion of the shell, when it is retained. The color is a bright yellow, becoming less intense in the senescent fourth of the shell, but often persisting even to the aperture. In some specimens reddish splotches are noticeable. There are 12 to 14 riblets beginning upon the early portion of the nine-angled tip; these may be later increased somewhat by further intercalation of less prominent secondary riblets, and all finally become evanescent and disappear at about the middle portion of an adult shell, the anterior half being smooth and highly polished. The intercostal spaces are reticulated by a very delicate microscopic sculpture more apparent in the first quarter of the shell. This reticulation, along with the riblets, finally disappears, as all the sculptural features merge and fuse into a smooth surface. A shallow, broad notch on the convex side is a probable apical feature, though not often noticeable.

The type, Cat. No. 314391, U.S.N.M., measures—length, 26.5 mm.; diameter, 2 mm. It was dredged off Key West, Florida, in 110 fathoms, being *Eolis* Station No. 333.

This is a subspecies chiefly of the Florida Keys region, occurring just within the line of the Gulf Stream. It differs from *Dentalium* *ceratum ceratum* in the greater number of its early riblets, a shorter stouter apex, and a more rapidly increasing diameter. The yellow color seems to be more constant and vivid. It occupies an intermediate position between *D. ceratum ceratum* and *D. taphrium*, though quite distinct from both.

The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 9	314391	Off Key West, Florida, *Eolis* Station 333	110 fms.
1	314392	Off Fowey Light, Florida, *Eolis* Station 123	22 fms.
4	314393	Key West, Florida, *Eolis* Station 344	100 fms.
2	314394	Key West, Florida, *Eolis* Station 146	98 fms.
1	323016	Key West, Florida, U. S. B. F. Station 2315	37 fms., co.
3	314395	Off Sand Key, Florida, *Eolis* Station 98	70–90 fms.
13	314396	Off Sand Key, Florida, *Eolis* Station 337	90 fms.
1	314397	Off Sand Key, Florida, *Eolis* Station 338	85 fms.
1	314398	Off Sand Key, Florida, *Eolis* Station 328	90 fms.
2	314399	Off Sand Key, Florida, *Eolis* Station 322	115 fms.
6	314400	Off Sand Key, Florida, *Eolis* Station 325	95 fms.
1	314401	Off Sambo Reef, Florida, *Eolis* Station 332	115 fms.
1	314402	Triumph Reef, Florida, *Eolis* Station 350	70–90 fms.
3	314403	Sambo Reef, Florida, *Eolis* Station 329	135 fms.
5	314404	Sambo Reef, Florida, *Eolis* Station 331	118 fms.
1	314405	Cabanas Harbor, Cuba, *Barrera* Station 202	25 fms.

[1] Type.

DENTALIUM (ANTALIS) CERATUM TENAX, new subspecies.

Plate 7, fig. 3.

The shell differs only from the typical subspecies in that it is less awl-shaped and more regularly curving; it is also rather more slender. The color is less yellow in all the National Museum specimens, but these have likely faded, as the material is old or poor. Almost complete tips show a smooth nuclear portion, with 9 primary riblets quickly increased to 12 or 14. All other sculptural features, including the delicate intercostal network, are as in *D. c. ceratum* and *D. c. flavum*. No apical notch is observable.

The type, Cat. No. 95331 (*a*), U.S.N.M., measures—length, 19 mm.; diameter, 1.75 mm. It is from Barbados, 76 fathoms, taken by the *Blake* at United States Coast Survey Station 272, bottom of coral and broken shell, with a temperature of 64.75° F.

Other lots in the museum collection are from Barbados, in 100 fathoms, Cat. No. 95330, U.S.N.M., taken by the *Hassler* in 1871, Barbados, in 33 fathoms; Cat. No. 314898, U. S. N.M., dredged by the State University of Iowa Expedition Station 51; Barbados, in 70 fathoms, Cat. No. 314899, U.S.N.M., dredged by the State University of Iowa Expedition Station 79.

This is a geographic race of *D. ceratum*, occupying the extreme southern limit of the range of that species. It is of the *D. c. flavum* type of ribbing, but smaller and more slender than that Floridian subspecies.

DENTALIUM (ANTALIS) TAPHRIUM Dall.

Plate 7, fig. 8.

1889. *Dentalium taphrium* DALL, Bull. Mus. Comp. Zool., vol. 18, p. 422.
1889. *Dentalium taphrium* DALL, Bull. 37, U. S. Nat. Mus., p. 76.
1897. *Dentalium taphrium*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 58.
1901 (?). *Dentalium taphrium* DALL and SIMPSON, U. S. Fish. Comm. Bull. for 1900, vol. 1, p. 455, pl. 54, fig. 19.
1903. *Dentalium taphrium* DALL, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is rather short, awl-shaped, with its maximum curvature at the base of the tip; thereafter it is but slightly curved. It quickly expands in diameter at the start and thence through the middle and anterior portions very gradually. A very constant and characteristic feature is its apple green color. On the sculptured portion of the shell are series of irregular zones of translucency encircling the shell and so disposed as to impart a watered silk appearance. This color feature, however, does not extend to the smooth anterior portion of the cylinder, which is of a clear translucent apple green color and is polished and shining. There are 14 sharp, well-defined riblets, though originally probably nine primaries, which are quickly increased to double or even more by subsequent intercalation; all the riblets become lower and more square in outline, and finally growing fainter disappear into a smooth, highly polished glassy round cylinder. In the intercostal spaces is a network of microscopic transverse and longitudinal lines, which also disappear on the smooth, anterior portion of the shell. The longitudinal miscroscopic lines are usually indistinct. There is a shallow apical notch on the convex side.

Length, 17 mm.; diameter, 2 mm.; arc. 75 (type).

Length, 25 mm.; diameter, 2.25 mm.; arc, 2.1 (tip gone), Florida.

The type, Cat. No. 95320, U.S.N.M., was dredged between Mississippi Delta and Cedar Keys in 30 fathoms, gray sand and broken coral, being U. S. B. F. Station 2405; no bottom temperature given.

There are also lots from off Cape Hatteras and Cape Lookout in 22 to 52 fathoms, and many from the Florida Keys region in 20 to 60 fathoms, the majority of the records coming from 30 to 45 fathoms, just inside the Gulf Stream; also from Cabanas Harbor, Cuba, in 25 fathoms (form).

In the many lots of specimens studied there are none that prolong the final shell stage of smooth, glassy surface to the extent often seen in *Dentalium ceratum*. The proportion of the smooth to the sculptured portion in this species is usually about as one to seven.

The differences between this and its nearest relative, *D. ceratum*, are in the greater number of riblets; the green instead of yellow color, and in the presence of translucent zigazg zones, wholly lacking in *D. ceratum;* the relatively short smooth portion of the shell; the shorter length but equal diameter.

Geographically its range is more northerly and its depth zone less. Its characters are remarkably constant. There is no complete tip preserved among the many lots of the museum collection.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	95320	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2405.	30 fms. gy. s. bk. co. (type).
14	93120	31 miles southeast of Lookout, North Carolina, U. S. B. F. Station 2612.	52 fms., sand, crs. w. s. sh.
1	93119	17 miles off Lookout, North Carolina, U. S. B. F. Station 2608.	22 fms., sand, crs. gy. s. brk. sp.
6	92819	25 miles off Cape Hatteras, U. S. B. F. Station 2598.	22 fms., sand, wh. s. brk. sh.
1	329749	Off Cape Hatteras, U. S. B. F. Station 2598	22 fms., wh. s. sh.
8	314406	Miami, Florida, *Eolis* Station 312	25 fms.
5	314407	Miami, Florida, *Eolis* Station 49	30 fms., s. and co.
1	314408	Miami, Florida, *Eolis* Station 139	30 fms.
9	314409	Miami, Florida, *Eolis* Station 62	20 fms.
10	314410	Miami, Florida, *Eolis* Station 118	30 fms.
2	314411	Miami, Florida, *Eolis* Station 117	35–38 fms.
3	314412	Miami, Florida, *Eolis* Station 141	35 fms.
2	314413	Miami, Florida, *Eolis* Station 157	22 fms.
2	314414	Miami, Florida, *Eolis* Station 77	8 fms.
1	314415	Miami, Florida, *Eolis* Station 84	40 fms.
7	314416	Miami, Florida, *Eolis* Station 51	24 fms.
1	314417	Miami, Florida, *Eolis* Station 103	20 fms.
1	314418	Miami, Florida, *Eolis* Station 48	60 fms., g. mn.
4	314419	Miami, Florida, *Eolis* Station 93	18–25 fms.
4	314420	Miami, Florida, *Eolis* Station 122	30 fms.
2	314421	Miami, Florida, *Eolis* Station 114	20 fms.
2	314422	Miami, Florida, *Eolis* Station 51	24 fms.
2	314423	Off Fowey Light, Florida, *Eolis* Station 148	38 fms.
5	314424	Off Fowey Light, Florida, *Eolis* Station 90	44 fms.
1	314425	Off Fowey Light, Florida, *Eolis* Station 187	45 fms., sp.
2	314426	Off Fowey Light, Florida, *Eolis* Station 105	40 fms.
2	314427	Off Fowey Light, Florida, *Eolis* Station 121	30 fms.
1	314428	Off Fowey Light, Florida, *Eolis* Station 76	40 fms.
2	314429	Off Fowey Light, Florida, *Eolis* Station 188	48 fms., sp.
3	314430	Off Fowey Light, Florida, *Eolis* Station 78	30 fms.
6	314431	Off Fowey Light, Florida, *Eolis* Station 8	25 fms.
1	314432	Off Fowey Light, Florida, *Eolis* Station 134	40 fms.
8	314433	Off Fowey Light, Florida, *Eolis* Station 92	45 fms.
5	314434	Off Fowey Light, Florida, *Eolis* Station 121	30 fms.
2	314435	Off Fowey Light, Florida, *Eolis* Station 129	48 fms.
3	314436	Off Fowey Light, Florida, *Eolis* Station 142	40 fms.
2	314437	Off Fowey Light, Florida, *Eolis* Station 144	45 fms.
1	314438	Off Fowey Light, Florida, *Eolis* Station 91	42 fms.
2	314439	Off Fowey Light, Florida, *Eolis* Station 130	25 fms.
3	314440	Off Fowey Light, Florida, *Eolis* Station 107	40-50 fms.
3	314441	Off Fowey Light, Florida, *Eolis* Station 79	35 fms.
3	314442	Off Fowey Light, Florida, *Eolis* Station 150	35 fms.
5	314443	Off Long Reef, Florida, *Eolis* Station 135	38 fms.
8	314444	Off Couch Reef, Florida, *Eolis* Station 7	35 fms.
1	314445	Off Ajax Reef, Florida, *Eolis* Station,137	40 fms.
2	314446	Off Sand Key, Florida, *Eolis* Station 99	30 fms.
6	314447	Off Sand Key, Florida, *Eolis* Station 101	38 fms.
1	314448	Cabanas Harbor, Cuba, *Barrera* Station 202	25 fms.

KEY TO THE GROUP OF DENTALIUM BARTLETTI.

Primary riblets 18.
    Section slightly flattened .... *Dentalium bartletti*, page 55.
Primary riblets 16.
    Section round .... *D. tubulatum*, page 56.

DENTALIUM (ANTALIS) BARTLETTI, new species.

Plate 8, fig. 2, 7.

1881. *Dentalium antillarum*, DALL, Bull. Mus. Comp. Zool., vol. 9, p. 37 (not of Orbigny, 1846).

1889. *Dentalium antillarum*, DALL, Bull. Mus. Comp. Zool., vol. 18, p. 421 (not of Orbigny, 1846).

1889. *Dentalium antillarum*, DALL, Bull. 37, U. S. Nat. Mus., p. 76, in part.

1897. *Dentalium antillarum*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 57, in part. Not figured on pl. 14.

1903. *Dentalium antillarum*, DALL, Bull. 37, U. S. Nat. Mus., p. 76 (in part).

In the National Museum collection are a number of lots of long, slender, slightly curved *Dentalia*, with very fine longitudinal riblets, all collected from the continental slope zone. For the most part these shells have been referred to Orbigny's *D. antillarum*. They all bear the glazed aspect so characteristic of many deep-water Scaphopods, and they possess, moreover, no trace of any transverse sculpture. They also belong to a deeper, colder water zone than does Orbigny's *D. antillarum*, which is a semilittoral species. The following diagnosis is given from an excellent specimen taken off Frederickstadt:

The shell is very slightly curved, the chief curvature occurring rather abruptly near the posterior end, quite thin; regularly increasing in diameter to 4 mm. in a length of 42 mm. The color is ivory white. The apical sculpture consists of about 18 thread-like riblets, with smooth spaces between of double their own width. The ribs continue to the posterior end in a slightly wavy course, their original primaries being greatly increased in number of intercalation of secondaries. At the oral end of the shell the ribs are 40 to 50 in number, but less distinct and are wider than their intervals. In the anterior half minute growth lines to be seen under a lens interrupt the longitudinal riblets, giving a roughened or wavy appearance to the surface. The entire surface has a glazed ivory white finish. The anal orifice bears a wide, fairly deep apical notch on the convex side. The shell is slightly flattened laterally and the aperture is oblique.

Length, 42 mm.; greater diameter, 3.75 mm.; lesser diameter, 3.5 mm.; arc, 1.7 (type).

Length, 55 mm.; greater diameter, 4 mm.; lesser diameter, 4 mm.; arc, 1.75 (tip gone).

Length, 34 mm.; greater diameter, 2.5 mm.; lesser diameter, 2 mm.; arc, 1.1 (Florida specimen).

Same variation is shown in the rate of increase of diameter. In a specimen from 193 fathoms off Cape Florida the shell is much more slender than the type, though preserving all other characters of the species.

The type, Cat. No. 224986, U.S.N.M., was taken by the *Blake* at the U. S. Coast Survey Station 130, off Frederickstadt, Santa Cruz, in 451 fathoms, gray ooze, bottom temperature 44.5° F.

The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	224986	Frederickstadt, *Blake* Station 130	451 fms. (type) gy. oz., 44.5°.
1	93121	Off Cape Fear, U. S. B. F. Station 2616	17 fms., s. p.
1	314449	Off Fowey Light, Florida, *Eolis* Station 353	85 fms.
1	330524	Off Cape Florida, Florida, U. S. B. F. Station 2644	193 fms., gy. s., 43.4°.
1	314450	Off Fowey Light, Florida, *Eolis* Station 372	100 fms.
9	93840	Between Mississippi Delta and Cedar Keys, U. S. F. C. Station 2398.	227 fms., 48.6° gy. m.
1	323776	Off Cape San Blas, Florida, U. S. B. F. 2399	196 fms., gy. m., 51.6°.
3	94368	N. W. of Tortugas, *Blake* Station 44	539 fms., 39.5°.
1	95370	Off Morro Light, Habana, *Blake* Station 100	400 fms.
1	94081	Off Arrowsmith Bank, Yucatan, U. S. B. F. 2355	399 fms., yl. oz.
11	95371	St. Vincent, West Indies, *Blake* Station 230	464 fms., 41.5° fne. s.
1	95369	Martinique, *Blake* Station 211	357 fms., fne. s.

DENTALIUM (ANTALIS) TUBULATUM, new species.

Plate 8, fig. 5.

The shell is of porcellanous texture, almost straight, with a very gradual increase in diameter; it has 16 sharply defined longitudinal riblets, separated by smooth intercostal spaces, double their width; no intercalation takes place before a point about midway between the tip and the aperture; then one delicate wavy riblet faintly appears in each space. These secondaries gradually increase in importance, widening as do the original primary riblets until at the oral end of the shell all are so widened and flattened that the intercostal spaces are almost obliterated. Over the anterior portion of the shell distinct growth lines produce a wavy appearance in the riblets. The cylinder is round and the aperture is not oblique. There is a broad and shallow apical notch on the convex side.

This species is closely related to *Dentalium bartletti*, but differs in its straightness, its slenderness, and round section, the less glazed surface, and finally in its 16 instead of 18 primary riblets.

The type, Cat. No. 95367, U.S.N.M., measures: Length, 37 mm.; diameter, 2.4 mm.; curvature, about 0.90 (tip gone). It is from a lot of two specimens, the other measuring—Length, 37 mm.; diameter, 2.25 mm.; arc, 1 (tip gone); and was dredged off Bahia Honda, Cuba, by the *Blake* at the United States Coast Survey Station 20, in 220 fathoms, bottom temperature 62° F.

Other lots are five specimens (fragments), Cat. No. 108160, U.S.N.M., from U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, gray sand and dead coral, bottom temperature 46.3°.

Subgenus HETEROSCHISMA Simroth, 1895.

1895. *Heteroschisma* Simroth, Bronn's Klassen u. Ordnungen des Thier-Reichs, vol. 3, p. 460.

Shell coarsely striate longitudinally and with an apical slit placed on the concave side.

This is a subgenus of doubtful value, as it can not be made to include all species possessing the peculiarity of an apical slit on the concave side—its one distinguishing feature. Pilsbry and Sharp[1] have restricted the group to two species, one of which is certainly, and the other doubtfully, of western Atlantic distribution.

DENTALIUM (HETEROSCHISMA) CALLITHRIX Dall.

Plate 8, figs. 3, 4, 6.

1889. *Dentalium callithrix* DALL, Bull. Mus. Comp. Zool., vol. 18, p. 427, pl. 27, fig. 10.
1889. *Dentalium callithrix* DALL, Bull. 37, U. S. Nat. Mus., p. 75, pl. 27, fig. 10.
1889. *Dentalium callithrix* DALL, Proc. U. S. Nat. Mus., vol. 12, p. 240.
1897. *Dentalium* (*Heteroschisma*) *callithrix*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 62, pl. 7, fig. 3.

The shell is regularly, moderately to strongly curved, with a gradual increase in diameter; it is slightly laterally compressed, causing the oral aperture to be slightly oval. The color is white, porcellanous, but not polished or shining. The tip is nine-angled, with smooth concave intercostal spaces, which later become flatter. At a certain point the intercostal spaces assume, all at the same time, at least three intercalated secondary riblets, which gradually increase in distinctness as the primaries lose, all finally becoming subequal in the anterior portion of the shell. In some cases the primaries retain a slight predominance over the secondaries, even to the aperture. There is no transverse sculpture beyond some hardly observable growth lines, which, toward the aperture, lend a slightly wavy appearance to the riblets. There is no perfectly smooth surface even in senile specimens. A fairly long slit on the concave side is the apical feature.

Length, 24 mm.; greater diameter, 2.75 mm.; lesser diameter, 2.25 mm.; arc, 1.8 type (juv.).

Length, 52.75 mm.; greater diameter, 3.25 mm.; lesser diameter, 3 mm.; arc, 6.5; senile specimen, St. Kitts.

Length, 28.25 mm.; greater diameter, 3 mm.; lesser diameter, 2.75 mm.; arc, 2 (juv.), Cape Fear.

Length, 38 mm.; greater diameter, 3.1 mm.; lesser diameter, 2.9 mm.; arc, 2 Brazil.

The type, Cat. No. 95348, U.S.N.M., was taken by the *Blake* at a United States Coast Survey Station not recorded in Yucatan Straits, in 640 fathoms.

This is a remarkably constant species of exceptionally wide range. It belongs to the lower zones of the continental shelf and to the ocean floor. The Argentine record consists of but broken fragments, though recognizable. The depth of 11 fathoms, as given at this Argentine station, suggests an error as already commented upon.

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[1] Tryon, Man. Conch., vol. 17, p. 61–62.

The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	95348	Yucatan Strait, *Blake* Station (?)	640 fms.
7	93426	Off Cape Fear, North Carolina, U. S. B. F. Station 2678.	731 fms., gy. oz., 38.7°.
2	93758	Bet. Miss. Delta and Cedar Keys, Station 2383.	1,181 fms., gr. mud, 40°.
1	95349	Off Bahia Honda, Cuba, *Blake* Station 20	220 fms., 62°.
11	87553	South of St. Kitts, U. S. B. F. Station 2751	687 fms., bu. oz., 39.9°.
9	330759	South of St. Kitts, U. S. B. F. Station 2751	Do.
2	95350	Off Bequia, *Blake* Station 236	1,591 fms., lt. br. oz., 39°.
3	87555	East of Tobago, U. S. B. F. Station 2751.	880 fms., oz., 37.9°.
1	314451	Brazil, U. S. B. F. Station 2763	671 fms., 37.9° br. glob. oz.
15	330834	Off Rio de la Plata, U. S. B. F. Station 2764	11½ fms., s., brk. sh.

[1] Type.

DENTALIUM (HETEROSCHISMA) SUBTERFISSUM Jeffreys.

Doctor Watson has referred to this European species of Jeffreys some specimens taken by the *Challenger* at Station 120 off Pernambuco in 675 fathoms.[1] I am inclined to believe that these specimens are probably referable to Doctor Dall's *callithrix* rather than to the northeast Atlantic species of Jeffreys. In the present state of doubt I include it in this list only as a possible member of the faunal area under discussion.

Subgenus FISSIDENTALIUM Fischer, 1895.

1895. *Fissidentalium* Fischer, Manuel de Conchyliologie, p. 894.

"A long fissure on the convex side in the posterior portion of the shell; surface longitudinally striate." Pilsbry and Sharp [2] have expanded this very meager description to include a series of very large solid shells with very many longitudinal riblets and with or without a long slit at the apex. The value of the subgenus is very doubtful. The western Atlantic species included in this paper are *Dentalium meridionale* with its several subspecies, *D. floridense*, and *D. amphialum*—all *Dentalia* with large shells and belonging to rather deep water zones. The following key is not very satisfactory, but may aid in separating the forms:

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[1] *Challenger* Report, Gastropoda and Scaphopoda, p. 10.

[2] Tryon, Man. Conch., vol. 17, p. 63.

KEY TO THE SPECIES OF THE SUBGENUS FISSIDENTALIUM.

- Tip hexagonal; size medium (74 mm. by 10 mm.).
  - Maximum of 24 riblets, color yellowish .... *floridense*, page 64.
- Tip 16 ribbed.
  - Maximum of 90 riblets; ashen or mouse color.
    - Riblets persisting to aperture.
      - Very large (length 108 mm. by diameter 14 mm.) ..... *meridionale*, page 59.
      - Stouter forms (diameter 14 mm.) .... *m. meridionale*, page 61.
      - Slenderer forms (diameter 10 mm.) .... *m. jamaicense*, page 62.
    - Riblets not persisting to aperture.
      - Medium sized (length 96 mm. by diameter 10 mm.) ..... *m. verrilli*, page 62.
  - Maximum of 50 riblets; yellowish brown.
    - Smaller size (length 50 mm. by diameter 7.5 mm.) ..... *amphialum*, page 59.

DENTALIUM (FISSIDENTALIUM) AMPHIALUM Watson.

Plate 8, fig. 1.

1879. *Dentalium amphialum* Watson, Journ. Linn. Soc. London, vol. 14, p. 510.

1885. *Dentalium amphialum* Watson, *Challenger* Report, Scaphopoda, etc., p. 3, pl. 1, fig. 3.

1897. *Dentalium* (*Fissidentalium*) *amphialum*, Pilsbry and Sharp, Man. Conch., vol. 17, p. 71, pl. 8, fig. 37.

Shell is long, large, almost straight, and equally curved. The color is a dirty brownish yellow; the texture is chalky, a soft outer layer covering a porcellanous portion, with many shell layers shown in section. There are 50 slightly raised primary riblets with shallow open spaces between, the riblets disappearing anteriorly. No transverse sculpture is present beyond growth line "scratches," becoming "harsh" and "broken" toward the anterior end of the cylinder. There is a short irregular apical fissure on the convex side.

The type is in the British Museum. It measures—length, 50 mm.; diameter, 7.5 mm.

Taken off the mouth of the La Plata River in 1,900 fathoms, blue mud, temperature 33.1° F., *Challenger* Station No. 323.

This species is not represented in the National Museum collection and I have seen no examples. Doctor Watson's description indicates a species very close to *Dentalium meridionale*.

DENTALIUM (FISSIDENTALIUM) MERIDIONALE Pilsbry and Sharp.

In 1884 Professor Verrill published his description of *Dentalium solidum*, a species from deep water off Block Island and the Delaware Capes. A very full series of this large *Dentalium*, including many living examples, had been taken the year before by the *Albatross* from numerous stations off southern New England. Five years later, in reviewing the Scaphopods of the coast, Doctor Dall united this species with the European *D. candidum*, described by Jeffreys in 1877, from northeast Atlantic stations in 410 to 1,750 fathoms. In 1897 Pilsbry and Sharp, in their monograph of the order, accepted Dr. Dall's disposition of Verrill's species, retaining for it Jeffreys's name and relegating "*solidum*" to the synonymy. In the meantime, however, more lots of apparently the same, or at least a very closely allied species, were sent in by the *Albatross*, dredged off Cape Fear, South Carolina, in 731 fathoms; off Jamaica in 966 fathoms; and off the Brazilian coast in 671 fathoms. These later lots Doctor Pilsbry removed from typical *D. candidum* under the subspecific name of *D. c. meridionale*.

Jeffreys's specimens, including his type lot, are now in the National Museum collection, and consist of 10 lots, mostly of fragments, which are scarcely recognizable except when immediately associated with good specimens from the same stations. Besides what appears to be his original series of *D. candidum*, there are two lots of fair but young and immature specimens, one from "Station 28, Porc. Exp. off Hebrides in 1,215 fathoms," and the other of two specimens from off the West Coast of Africa and Azores, taken by the *Talisman* expedition. The shells of the first of these lots answer only fairly well to Jeffreys's composite description; those of the second are obviously of another species and much more closely resemble our own shells from the American coast. A careful comparison of the only really recognizable specimen in the Jeffreys collection that can be accepted as the true *D. candidum* with American shells of the same growth period convinces me of the error of uniting them. Even were the sculptural characters more clearly identical, the shining white compact texture of the British specimen makes questionable its union with the soft, chalky American shells, covered as they all are with an ashy or mouse-colored periostricum. Its rate of increase in diameter is also less and the curvature is not quite the same.

D. candidum Jeffreys, the unnamed Azores specimen, the northern lots of *D. capillosum* Jeffreys, *D. solidum* Verrill, and *D. c. meridionale* Pilsbry and Sharp, are all closely allied species of the same group. It is, however, straining their characters actually to unite them specifically.

I would therefore restore Verrill's name to the American species, but as his name of *solidum* is preoccupied I rename it *verrilli*. Doctor Pilsbry's *meridionale* must then take priority and the group is rearranged as follows:

Dentalium meridionale Pilsbry and Sharp, 1897.

Dentalium meridionale meridionale Pilsbry and Sharp.

Dentalium meridionale verrilli, new name (=*D. solidum* Verrill=*D. candidum* Authors) (not of Jeffreys).

Dentalium meridionale jamaicense, new subspecies.

DENTALIUM (FISSIDENTALIUM) MERIDIONALE MERIDIONALE Pilsbry and Sharp.

Plate 9, fig. 2.

1881. *Dentalium ceras*, Dall, Bull. Mus. Comp. Zool., vol. 9, p. 37 (not *D. ceras* Watson).

1889. *Dentalium ceras*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 425 (not *D. ceras* Watson).

1889. *Dentalium ceras*, Dall, Proc. U. S. Nat. Mus., vol. 12, p. 294 (not *D. ceras* Watson).

1897. *Dentalium* (*Fissidentalium*) *candidum meridionale* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 73, pl. 15, figs. 32, 33, 34.

The shell is very long, large, solid, and strong, moderately curved, regularly and rather rapidly increasing in diameter and somewhat compressed dorso-ventrally, giving a rounded oval section; an ashen gray or mouse colored periostricum covers a white but not shining surface beneath. The nacreous layer within the shell is bluish white. There are about 16 riblets in the extreme posterior end, separated by wider, shallow, smoothish spaces between. These primary riblets increase to 90 or more flat-topped, gradually broadening riblets, which eventually reduce the intercostal spaces to mere lines and persist with but little effacement to the anterior end of adult specimens. No transverse sculpture beyond fine growth lines is present. The apical features consist of a deep notch placed on the convex side.

Length, 101 mm.; greater diameter, 12.8 mm.; lesser diameter, 12.3 mm.; arc, 5; type.

Length, 108 mm.; greater diameter, 14 mm.; lesser diameter, 13 mm.; arc, 5; Rio de Janeiro.

The type, Cat. No. 87557 (*a*), U.S.N.M., was dredged by the *Albatross* at U. S. B. F. Station 2763, 240 miles south by east from Rio de Janeiro, in 671 fathoms, gray ooze, bottom temperature 37.9° F.

This deep-water subspecies is by far the largest of any of the *Dentalia* so far known from the western Atlantic. The mouse or ashen colored outer shell layer is unique among all species of the area. This subspecies is restricted to the very large, broad forms from off Rio de Janeiro. A worn fragment from Barbados, taken in 100 fathoms, State University of Iowa Expedition, is clearly referable to this subspecies.

The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	87557	Southeast of Rio de Janeiro, U. S. B. F. Station 2763.	671 fms., 37.9°, br. glob. oz.
8	314452	Brazil, U. S. B. F. Station 2763	Do.
2	87557	Rio de Janeiro, U. S. B. F. Station 2763	Do.
2	87538	do	Do.
1	95353	North of Yucatan Bank, Blake Station 33	1,568 fms.

[1] Type.

DENTALIUM (FISSIDENTALIUM) MERIDIONALE JAMAICENSE, new subspecies.

Plate 9, fig. 4.

1889. *Dentalium candidum*, Dall, Proc. U. S. Nat. Mus., vol. 12, p. 294 (not *D. candidum* Jeffreys).

1897. *Dentalium candidum meridionale* Pilsbry and Sharp (part), Tryon's Man. Conch., vol. 17, p. 73.

The shell differs from the typical subspecies only in being more slender, while possessing the same number and character of riblets.

The specimen selected from a lot of six specimens for the type, Cat. No. 103519, U.S.N.M., was taken at the U. S. B. F. Station 2140, near Jamaica, in 966 fathoms, coral sand, bottom temperature 39.7°. It measures—length, 110 mm.; greater diameter, 11 mm.; lesser diameter, 10 mm.

Also a lot of two specimens, Cat. No. 87556, U.S.N.M., from U. S. B. F. Station 2760, 90 miles north of Caera, Brazil, in 1,019 fathoms, broken coral; bottom temperature, 39.4°.

An intermediate form between this and the northern *Dentalium meridionale verrilli* is met with in 731 fathoms off Cape Fear. The sculpture persists to the oral end, but the shell begins to take on the chalky texture and thicker periostricum so characteristic of the boreal form. This is a lot of five specimens, Cat. No. 93425, U.S.N.M., taken at the U. S. B. F. Station 2678, in 731 fathoms, ooze; bottom temperature, 38.7° F.

DENTALIUM (FISSIDENTALIUM) MERIDIONALE VERRILLI, new name.

Plate 9, fig. 3.

1884. *Dentalium solidum* Verrill, Trans. Conn. Acad. of Arts and Sci., vol. 6, p. 215, pl. 44, fig. 16 (not *solidum* Hutton, 1873).

1889. *Dentalium candidum*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 422, in part (not *Dentalium candidum* Jeffreys, 1877).

1889. *Dentalium candidum*, Dall, Bull. 37, U. S. Nat. Mus., p. 76 (not of Jeffreys).

1893. *Dentalium candidum*, Bush, Bull. Mus. Comp. Zool., vol. 34, No. 6, p. 223 (not of Jeffreys).

1897. *Dentalium candidum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 72, in part, pl. 8, figs. 27, 28 (not figs. 29, 30); pl. 15, figs. 39, 40.

1903. *Dentalium candidum*, Dall, Bull. 37, U. S. Nat. Mus., p. 75 (not of Jeffreys).

The shell is very large, heavy, strong, regularly increasing in diameter, with its chief curvature near the tip or in the posterior third, the balance of the shell being almost straight (variable). The section is round, periostricum thin, shell thickest just back of aperture. Specimens are rather given to abnormalities. It is ashen gray or mouse colored, a glossy periostricum covering a thick chalky white layer beneath, which in turn surrounds an inner nacreous hard layer of a bluish white tint. The outer shell surface is usually worn away in spots, especially about the apical end, leaving exposed the middle soft chalky layer, which is itself quite subject to the destructive chemical action of sea water. The sculpture consists of about 16 to 20 primary riblets, narrower than the spaces they separate; these are increased to double the original number, or more, all becoming broader and flatter, thus reducing the intercostal spaces to mere threads; finally, at about the beginning of the anterior third they fuse into a smooth surface, in which every trace of sculpture is lost, save for some irregular growth lines. The sculptural features are confined to the outer shell layer, and, though superficial, are very noticeable wherever the periostricum is intact. An apical notch as in the typical subspecies is present, but is less deep.

Length, 82 mm.; diameter, 10 mm. (Verrill).

Length, 75 mm.; diameter, 9 mm. (Verrill).

Length, 96 mm.; diameter, 10 mm.; arc, 4.5 (off Chesapeake).

No single specimen seems to have been set apart by Verrill as a type. A selected type, Cat. No. 34687, U.S.N.M., was dredged by the *Albatross* at U. S. B. F. Station 2083, off Georges Banks, in 959 fathoms, gray mud, bottom temperature, 40° F. It measures—length, 80 mm.; diameter, 10 mm.

A large series in the museum collection from off Block Island and Nantucket to Hatteras in 843 to 1,813 fathoms is shown in the following table:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
6	50186	Southeast of Georges Bank, U. S. B. F. Station 2531.	852 fms., 38.4°, gy. m.
17	34904	Off Georges Bank, U. S. B. F. Station 2077	1,255 fms., 39°, bw. m.
2	34687	Off Georges Bank, U. S. B. F. Station 2083	959 fms., 40°, gy. m.
1	38149	Off Georges Bank, U. S. B. F. Station 2076	906 fms.; bw. m.
40	34911	Off Georges Bank, U. S. B. F. Station 2084	1,290 fms., 40°, bw. m. s.
1	52087	Off Georges Bank, U. S. B. F. Station 2570	1,813 fms., 37°, glob. oz.
2	40394	South of Long Island, U. S. B. F. Station 2234	810 fms., 39°, gn. m.
1	38634	Off Marthas Vineyard, U. S. B. F. Station 2222	1,537 fms., 36.9°, gy. oz.
5	34688	Off Marthas Vineyard, U. S. B. F. Station 2094	1,022 fms., 38.5°, form. s. m.
1	38637	Off Marthas Vineyard, U. S. B. F. Station 2216	963 fms., 39.5°, gn. m.
1	38110	Off Marthas Vineyard, U. S. B. F. Station 2093	1,000 fms., 39°, form. s. m.
3	38393	Off Marthas Vineyard, U. S. B. F. Station 2077	1,255 fms., 39°, bw. m.
8	39985	Off Nantucket, U. S. B. F. Station 2217	924 fms., 38.1°, gn. m.
4	39977	Off Nantucket, U. S. B. F. Station 2195	1,058 fms., 38.4°, gn. m.
11	34917	Off Nantucket, U. S. B. F. Station 2052	1,098 fms., 45°, glob. oz.
10	34916	Off Nantucket, U. S. B. F. Station 2051	1,106 fms., 39°, bw. m. glob. oz.
2	34757	Off Nantucket, U. S. B. F. Station, 2050	1,050 fms., 49°, glob. oz.
3	39976	Off Nantucket, U. S. B. F. Station 2193	1,122 fms., 38.4°, gn. m.
12	39986	Off Nantucket, U. S. B. F. Station 2220	1,054 fms., 38.3°, gy. m.
3	51374	Off Nantucket, U. S. B. F. Station 2192	1,060 fms., 38°, gy. oz.
11	39983	South of Block Island, U. S. B. F. Station 2209	1,080 fms., 39.5°, gn. m. s.
33	76829	South of Block Island, U. S. B. F. Station 2748	1,163 fms., 37.8°, gn. m. form.
6	39984	South of Block Island, U. S. B. F. Station 2210	991 fms., 38.1°, glob. oz.
12	39979	Block Island, U. S. B. F. Station 2205	1,073, fms., 38.1°, gy. oz.
5	39981	Block Island, U. S. B. F. Station 2207	1,061 fms., 38.6°, gn. m.
1	51375	Block Island, U. S. B. F. Station 2203	705 fms., 38.9°, gn. m. s.
11	78827	Off Delaware Bay, U. S. B. F. Station 2732	1,152 fms., 38°, dk. gn. m.
7	78829	Off Delaware Bay, U. S. B. F. Station 2733	944 fms., 38°, gn. m.
6	78826	Off Delaware Bay, U. S. B. F. Station 2734	841 fms., 38°, sft. gn. m.
2	78973	Off Delaware Bay, U. S. B. F. Station 2735	811 fms., 38°, sft. gn. m.
7	51377	Off Delaware Bay, U. S. B. F. Station 2230	1,168 fms., 36.8°, gy. oz.
13	35636	Off Delaware Bay, U. S. B. F. Station 2103	1,091 fms., 39°, glob. oz.
1	35500	Off Delaware Bay, U. S. B. F. Station 2102	1,209 sms., 39°, glob. oz.
1	35373	Off Delaware Bay, U. S. B. F. Station 2104	991 fms., 41.5°, bw. m.
1	78970	Off Chesapeake Bay, U. S. B. F. Station 2727	1,239 fms., 37°, gy. oz.
6	78972	Off Chesapeake Bay, U. S. B. F. Station 2728	859 fms., 38°, gy. oz.
5	78971	Off Chesapeake Bay, U. S. B. F. Station 2731	781 fms., 38°, gy. oz.
2	78907	Off Chesapeake Bay, U. S. B. F. Station 2729	679 fms., 38°, dk. gn. m.
1	35467	Off Cape Hatteras, U. S. B. F. Station 2116	888 fms., 39°, bw. m. fne. s.
6	314453	Off Cape Hatteras, U. S. B. F. Station 2111	938 fms., gn. m.

DENTALIUM (FISSIDENTALIUM) FLORIDENSE, new species.

Plate 10, figs. 1, 2, 6, 7.

1885. *Dentalium capillosum*, Watson, *Challenger* Report Scaphopoda, p. 1, in part. (Not of Jeffreys.)

1889. *Dentalium capillosum*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 425, in part. (Not of Jeffreys.)

1889. *Dentalium capillosum*, Dall, Bull. 37, U. S. Nat. Mus., p. 76. (Not of Jeffreys.)

1897. *Dentalium capillosum*, Pilsbry and Sharp, Tryon's Man. Conch., 17, p. 77, in part and omitting figures on pl. 8. (Not of Jeffreys.)

1903. *Dentalium capillosum*, Dall, Bull. 37, U. S. Nat. Mus., p. 76. (Not of Jeffreys.)

The shell is solid, regularly but not greatly curved and rapidly increasing in diameter. Early part of tip awl-shaped and very slender. The section almost round. Yellowish white in color, porcellanous, but not shining. The tip is hexagonal, the angles pinched up into sharp ridges, separated by smooth slightly concave spaces between. At about 12 mm. from the apex intercalation of one rib in each intercostal space takes place, the six original angles broaden into primary ribs, and the section of the shell becomes round. The ribs increase to 24, become rounded, and of approximately equal importance and are separated by spaces of equal width; all the ribs persist to the oral aperture. The entire surface is covered by wavy growth lines which though more prominent on the posterior portion are always observable. These impart a roughened appearance to the longitudinal ribs which is better seen under a lens. There is a long, narrow apical slit on the convex side.

Length, 62 mm.; greater diameter, 8.5 mm.; lesser diameter, 8 mm.; arc, 3. Type.

Length, 74 mm.; greater diameter, 10 mm.; lesser diameter, 9.75 mm.; arc, 3.

The type, Cat. No. 314457 U.S.N.M., was dredged by the *Eolis* at her Station 301 off Sand Key, Florida, in 95 fathoms, rocky bottom.

Lots from various stations off Key West and Fowey Light, Florida, 35 to 110 fathoms, collected by the *Eolis*, and from Barbados in 100 fathoms, taken by the *Hassler* mark the only museum collection records.

The recent addition to the museum collection of excellent specimens from the edge of the Gulf Stream off the Florida Keys showing perfectly preserved tips as well as living adults, makes possible the definite diagnosis of this somewhat misunderstood species.

A comparison of our shell with Jeffrey's series of *Dentalium capillosum* from North Atlantic stations removes any question of their specific identity. I have not seen Watson's subspecific *D. c. paucicostatum*, but the description of this eastern Atlantic mollusk shows it to be undoubtedly of the same group of *D. floridense*, but not conspecific. The Pourtales shell from the Gulf Stream off Bahia Honda, doubtfully referred to by Watson in the *Challenger* Report as *D. paucicostatum*, is probably *D. floridense*. It is evidently a warm-water species of the continental shelf zones of the Antilles. Watson's specimen from off Culebra Island in 390 fathoms is only a fragment and very difficult of determination.[1] Under such circumstances I do not think it should be accepted as identical with a European species of boreal station.

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314454	Off Fowey Light, Florida, *Eolis* Station 353	85 fms.
2	314455	Off Western Dry Rocks, Florida, *Eolis* Station 319	90 fms.
1	314456	Off Key West, Florida, *Eolis* Station 334	90 fms.
2	314457	Off Sand Key, Florida, *Eolis* Station 301	95 fms., rocky (type).
2	314458	Off Sand Key, Florida, *Eolis* Station 323	110 fms.
1	314459	Off Sand Key, Florida, *Eolis* Station 326	75 fms.
1	314460	Off Sand Key, Florida, *Eolis* Station 6	35 fms., sand and broken shells.
2	314461	Off Sand Key, Florida, *Eolis* Station 324	100 fms.
1	95332	Barbados	100 fms. (Hassler).

Subgenus GRAPTACME Pilsbry and Sharp, 1897.

1897. *Graptacme* Pilsbry and Sharp, Tryon's Man. of Conchology, vol. 17, p. 85.

The shell is sculptured with very close, fine, deeply engraved longitudinal striae near the apex, all the balance of the shell being smooth. The apical characters are variable. They constitute a group of small to medium sized shells, generally living in moderate depths. The extent of surface occupied by the sculpture is also quite variable. The chief character of the subgenus is in the very fine engraved lines of the posterior portion, as contrasted with the more prominent ribbing so characteristic of other groups heretofore considered. The tips are never angled. The texture of the shell is usually glassy, with a smooth shining surface in the anterior portion, and the section is always round. The following key to the western Atlantic forms roughly characterizes the few species:

KEY TO THE SPECIES OF THE SUBGENUS GRAPTACME.

Apical aperture with slit plug .... *calamus*, page 72.
Apical aperture without slit plug.
  Apical slit on convex side, deep and narrow.
    With more than 20 longitudinal engraved lines .... *eboreum*, page 66.
    With less than 20 longitudinal engraved lines .... *circumcinctum*, page 68.
  Apical slit laterally placed.
    Large (25 to 34 by 3 to 4 mm.) .... *semistriolatum*, page 69.
    Small (17 by 1.5 mm.) .... *amaliense*, page 71.
  Apical slit doubtfully placed.
    Vivid zigzag gray color bands .... *sericatum*, page 71.

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[1] *Challenger* Report, p. 2.

DENTALIUM (GRAPTACME) EBOREUM Conrad.

Plate 10, figs. 3, 4, 5, 8, 9; plate 11, fig. 6.

1846. *Dentalium eboreum* Conrad, Proc. Acad. Nat. Sci. Phila., vol. 3, p. 27.
1885. *Dentalium leptum* Bush, Trans. Conn. Acad. Arts and Sci., vol. 6, p. 470, pl. 45, fig. 18, 18*a*.
1885. *Dentalium leptum* Bush, Report of Com. of Fish and Fisheries for 1883, p. 586 [84].
1889. *Dentalium leptum,* Dall, Bull. Mus. Comp. Zool., vol. 17, p. 421.
1889. *Dentalium leptum,* Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1889. *Dentalium matara* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 420.
1889. *Dentalium matara* Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1892. *Dentalium leptum,* Dall, Trans. Wagner Free Inst., Phila., vol. 3, pt. 2, p. 440.
1897. *Dentalium eboreum,* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 89, pl. 16, figs. 47–49, 55, 56.
1897. *Dentalium leptum,* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 89, pl. 16, fig. 50.
1897. *Dentalium matara,* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 105, pl. 18, figs. 14–18.
1901. *Dentalium matara* Dall and Simpson, Bull. U. S. Fish Com. for 1900, vol. 1, p. 456.
1903. *Dentalium leptum,* Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1903. *Dentalium matara* Dall, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is regularly, moderately curved, slender, thin but strong, with a long slightly arched tip. The color is a salmon pink, sometimes yellowish, generally fading to white, first on the anterior portion, then finally over the entire shell in all but fresh specimens. The surface is highly polished, shining and vitreous, though often variegated with milky, less translucent patches. The sculpture is confined to the tip only and consists of about 20 very fine raised longitudinal lines, visible only under a lens; all the balance of the shell is perfectly smooth save for slight growth irregularities. There is a rather deep, narrow apical notch on the convex side. In old specimens where the tip has been lost a projecting thin sheath of the inner shell layer from the posterior aperture is frequently developed, and in this case the apical slit is preserved and reproduced in the protruding sheath, and it is sometimes even repeated, though in lesser degree, on the concave side as well. Average specimens measure—length, from 25 to 35mm.; diameter, 2.5 mm.; with an arc of 2. An adult specimen of large size with tip intact would measure about—length, 62–65 mm.; diameter, 3 mm.; with an arc of 3.5 to 4.

The type of *Dentalium eboreum* is in the collection of the Philadelphia Academy of Sciences; topotypes in museum collection, Cat. No. 152957, U.S.N.M., are from Sarasota Pass, Florida.

The type of *Dentalium leptum,* Cat. No. 41562, U.S.N.M., are from off Hatteras, in 16 fathoms, from the U. S. B. F. Station 2276; bottom of gray sand and broken shells.

The type of *Dentalium matara*, Cat. No. 95363, U.S.N.M., off Cape Lookout, in 31 fathoms, bottom of black sand and broken shells, from the U. S. B. F. Station 2611.

In the National Museum collection are many lots from off Cape Hatteras, Beaufort, Cape Lookout, from the Florida east coast region in shallow water, 6 to 49 fathoms; from the Florida Keys region, 18 to 50 fathoms; west coast of Florida shore stations to 111 fathoms; also from San Juan, Porto Rico, and Barbados.

A lot from Samana Bay, consisting mostly of fragments, are not typical, being more strongly curved.

Conrad's *Dentalium eboreum* seems to have been overlooked until redescribed by Pilsbry and Sharp in 1897. Conrad's specimens showed no notch. We now know the absence of apical characters to be of frequent occurrence in many of the *Dentalia*. On account of its insufficient description, Miss Bush evidently discarded Conrad's species when determining the status of her own *D. leptum*.

Practically all large, fully adult or senile specimens lose the entire tip, leaving a perfectly smooth, highly polished sculptureless shell. This is Dall's *Dentalium matara*. I have only been willing to unite these three species after a most critical examination of many lots, and I do not believe them to be separable even subspecifically.

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	35379	Off Cape Hatteras, U. S. B. F. Station 2112	15.5 fms., 73.5° s. blk. sp. (type of *leptum*).
1	41562	Off Cape Hatteras, U. S. B. F. Station 2276	16 fms., gy. s. brk. sh. (fig'd. spec. *leptum*).
5	322475	Off Cape Hatteras, U. S. B. F. Station 2112	15 fms., 73.5°, s. blk. sp.
19	41542	Off Cape Hatteras, U. S. B. F. Station 2292	17 fms. (mostly fragments), gy. s. brk. sh.
30	44452	Off Cape Hatteras, U. S. B. F. Station 2278	16 fms. (tips and fragments), gy. s. brk. sh.
35	45193	Off Cape Hatteras, U. S. B. F. Station 2275	16 fms. (young), gy. s. brk. sh.
60	40777	Off Cape Hatteras, U. S. B. F. Station 2277	16 fms. (mostly young), gy. s. brk. sh.
1	93111	Off Cape Hatteras, U. S. B. F. Station 2269	49 fms., 77°, crs. bl. gy. s.
8	92828	Off Cape Hatteras, U. S. B. F. Station 2295	22 fms., 73.5°, crs. gy. s.
1	322720	Off Cape Hatteras, U. S. B. F. Station 2277	16 fms., gr. s. brk. sh.
4	44453	Off Cape Hatteras, U. S. B. F. Station 2280	16 fms. gy. s. brk. sh.
42	45192	Off Cape Hatteras, U. S. B. F. Station 2273	17 fms., 72.3° (mostly tips and fragments), gy. s. brk. sh.
22	41562	Off Cape Hatteras, U. S. B. F. Station 2276	16 fms. (mostly young), gy. s. brk. sh.
8	45191	Off Cape Hatteras, U. S. B. F. Station 2272	15 fms. (young), gys. s. blk. sp.
50+	93112	20 miles southwest by south from Hatteras, U. S. B. F. Station 2597.	15 fms., sand (young).
40+	35860	Off Hatteras, U. S. B. F. Station 2112	15 fms. crs. gy. s.
7	35788	Off Hatteras, U. S. B. F. Station 2114	15.5 fms., 73.5°, s. blk. sp.
3	40884	Off Hatteras, U. S. B. F. Station 2289	14 fms., 72° (fragments), m. blk. s.
7	44451	Off Hatteras, U. S. B. F. Station 2269	7 fms., crs. s. blk. sp.
40+	41585	Off Hatteras, U. S. B. F. Station 2276	48 fms., 77°, crs. gy. blk. s.
25	198151	Off Hatteras, U. S. B. F. Station	16 fms., (?) gy. s. brk. sh.
14	250180	Off Hatteras, U. S. B. F. Station 2601	16 fms., (?) gy. s. brk. sh.
5	41466	Off Hatteras, U. S. B. F. Station 2291	87 fms., 71.5°, fine gy. s.
11	35380 and 35392	Off Hatteras, U. S. B. F. Station 2113	15 fms., gy. s. blk. sp.
1	95363	Off Cape Lookout, U. S. B. F. Station 2611	15 fms., 72.5°, m. blk. s.
8	93114	Off Cape Lookout, U. S. B. F. Station 2608	31 fms., 74° (type of *matara*), blk. s. brk. sh.
1	329954	do	22 fms., 78.2°, crs. gy. s.
2	330118	Off Cape Lookout, U. S. B. F. Station 2611	22 fms., crs. gy. s. sh., 78.2°.
13	93113	Off Cape Lookout, U. S. B. F. Station 2607	31 fms., brk. sh. blk. s., 74°.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
4	93116	Off Cape Lookout, U. S. B. F. Station 2612	18 fms., 73.5°, fine gy. s.
20	92821	Off Cape Lookout, U. S. B. F. Station 2610	52 fms., 67°, crs. wh. s.
5	92824	Off Cape Lookout, U. S. B. F. Station 2611	22 fms., 78.8°, wh. s. blk. sp.
2	92823	Off Cape Lookout, U. S. B. F. Station 2608	31 fms., 74°, blk. s. brk. sh.
2	314295	Off Beaufort, North Carolina, U. S. B. F. Station D7960.	22 fms., 75.5°, crs. gy. s.
44	314296	Off Beaufort, North Carolina, U. S. B. F. Station D7966.	14.5 fms., crs. s. sh.
6	314297	Off Bogue Inlet, North Carolina, U. S. B. F. Station D7997.	9.5 fms., gy. s. sh.
3	314298	Beaufort, North Carolina, U. S. B. F. Station B1415.	9.5 fms., s. sh.
105	314299	Beaufort, North Carolina, *Eolis* Station 21	6–9 fms.
9	314300	Cape Lookout Bight, North Carolina, *Eolis* Station 20.	3 fms.
8+ frag.	98118	Off Cape Fear, North Carolina, U. S. B. F. Station 2619.	15 fms., crs. yl. s. rot. co.
4	93117	Off Cape Fear, North Carolina, U. S. B. F. Station 2615.	18 fms., (fragments), gy. s.
15	382987	12 miles east of Frying Pan Shoals, Florida	12 fms. (Dr. Rush).
2	14301	12 miles east of Frying Pan Shoals, Florida (Ford collection).	12½ fms.
2	314302	Off Miami, Florida, *Eolis* Station 51	24 fms.
1	314303	Off Miami, Florida, *Eolis* Station 139	30 fms.
1	314304	Off Miami, Florida, *Eolis* Station 48	60 fms.
1	314305	Off Miami, Florida, *Eolis* Station 103	20 fms.
1	314306	Off Miami, Florida, *Eolis* Station 113	18–20 fms.
1	314307	Off Fowey Light, Florida, *Eolis* Station 119	23 fms.
4	314308	Off Turtle Harbor, Florida, *Eolis* Station 61	40 fms. (fragments).
1	314309	Off Turtle Harbor, Florida, *Eolis* Station 59	20 fms.
8	314310	Off Key West (Gulf), Florida, *Eolis* Station 102	10 fms.
7	14311	Off Key West (north), Florida, *Eolis* Station 30	7 fms.
1	95364	Between Tampa and Tortugas, U. S. B. F. Station 2409.	26 fms., crs. gy. s. brk. sh.
1	228738	Sanibal Island, (Ford collection).	
2	314312	Sanibal Island.	
14	228737	Sanibal Island (W. F. Clapp collection)	(W. F. Clapp).
7	152957	Sarasota Pass, Florida (beach)	(Post) (topotypes).
7	194635	Off Anclote Light, Florida, U. S. B. F. Station 7106.	12.5 fms., r. co. s. 63°.
1	195151	West coast of Florida, U. S. B. F. Station 5109	24 fms., 67° (Grampus).
1	83782	Charlotte Harbor, Florida (Dall)	
3	53908	Marco, Florida	2 fms. (H. Hemphill).
2	108797	Marco, Florida	(O. Tollin).
5	95366	Cape Romaine, Florida (Stearns collection)	(E. Jewett).
2	314313	Off coast of San Blas, U. S. B. F. Station 2369	26 fms., crs. gy. s. brk. sh
1	94095	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2402.	111 fms., gy. m.
1	161575	San Juan Harbor, Porto Rico	
7	95365	Samana Bay, Santo Domingo	16 fms.
4	314824	Money Island Bay, Beaufort, North Carolina, B. 1413.	2 fms.
1	314825	Money Island Bay, Beaufort, North Carolina, U. S. B. F. Station 7328.	Steamer *Fish Hawk*.
2	314900	Antigua, Falmouth Harbor, S. U. I. Exp. Station 105.	3 to 5 fms., sand and mud.

DENTALIUM (GRAPTACME) CIRCUMCINCTUM Watson.

Plate 11, fig. 7.

1879. *Dentalium circumcinctum* Watson, Journ. Linn. Soc. London, vol. 14, p. 513.

1886. *Dentalium circumcinctum* Watson, *Challenger* Report, Scaphopoda, p. 7, pl. 1, fig. 7.

1897. *Dentalium* (*Graptacme*) *circumcinctum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 88, pl. 8, fig. 26.

The shell is very long and slender, slightly curved, the arc mostly in the posterior portion; a little flattened on the concave curve, giving to the shell a slightly trigonal section; it is strong but not thick. The color is white, texture opaquely porcellanous, with a glossy surface. There are 17 to 20 fine longitudinal riblets separated by broader intercostal spaces; intercalation of secondary riblets increases the original number and all finally decrease in definiteness and merge into a rounded surface. Growth lines, "scratch-like puckerings," are present, about 55 to each one-tenth inch. The apical feature consists of an irregular ragged fissure on the convex side.

Length, 1.93 inches; diameter 0.13 inch (49.02 mm. by 3.3 mm.).

The type is in the British Museum collection. This species is quoted by Watson as occurring on both sides of the Atlantic, the western Atlantic records being off Sombrero Island in 470 fathoms, *Challenger* Station 23; off Bermuda in 1,075 fathoms, *Challenger* Station 56, and off Pernambuco in 350 fathoms, *Challenger* Station 122.

There are no examples in the National Museum collection, nor have I seen specimens. The description suggests a shell belonging to the group of *Dentalium bartletti*.

DENTALIUM (GRAPTACME) SEMISTRIOLATUM Guilding.

Plate 11, figs. 1, 2, 3, 8, 9.

(?) 1819. *Dentalium semistriatum* TURTON, Conch. Dict. British Isles, p. 39, pl. 18, fig. 68.

(?) 1825. *Dentalium nebulosum* DESHAYES, Mem. Soc. Hist. Nat., Paris, vol. 2, p. 369, pl. 16, fig. 20 (Not of Gmelin).

1834. *Dentalium semistriolatum* GUILDING, Trans.Linn. Soc., London, vol. 17, pt. 1, p. 34, pl. 3, figs. 1–5.

(?) 1843. *Dentalium translucidum* CHENU, Conch. Ill., vol. 1, p. 8, pl. 3, fig. 12 (Not of Deshayes).

(?) 1843. *Dentalium nebulosum*, CHENU, Conch. Ill., p. 5, pl. 6, fig. 4.

1843. *Dentalium semistriolatum*, CHENU, Conch. Ill., p. 7, pl. 4, figs. 14, 15.

1843. *Dentalium semistriatum*, FORBES and HANLEY, Hist. Brit. Moll., vol. 2, p. 454.

(?) 1860. *Dentalium nebulosum*, SOWERBY, Theasurus, vol. 3, p. 98, pl. 225, fig.58.

(?) 1873. *Dentalium nebulosum*, SOWERBY, Reeve Conch. Icon., vol. 18, pl. 7, fig. 53.

(?) 1896. *Dentalium nebulosum*, CLESSIN, Syst. Conch. Cab., vol. 6, pt. 5, p. 19, pl. 5, fig. 5.

(?) 1897. *Dentalium* (*Graptacme*) *semistriatum*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 90, pl. 16, fig. 51, 52, 53.

In selecting Guilding's name from a somewhat confused synonymy I have taken the first that is expressly quoted from the Antilles, and which is also accompanied by a figure and description which leave no reasonable grounds for doubt. Deshayes's and Chenu's *Dentalium nebulosum*, especially as interpreted by Sowerby in the Thesaurus and in Reeve, seems likely to be this species, despite the vagueness of the localities given, some of which, however, are Antillean. Turton's *D. semistriatum*, as pointed out by Forbes and Hanley, is merely "exotic" and it may be this species. Chenu's *D. translucidum* (not of Deshayes nor of Sowerby in Reeve) is very suggestive, but is left without definite locality and may or may not be our species. I have excluded references to Pacific forms, generally regarded as synonymous, as I believe them to be distinct from our species.

These are *Dentalium semipolitum* Pilsbry and Sharp, *D. liratum* Carpenter, *D. liratulum* Mörch, etc. Whatever the others with more or less doubt may represent there can be no question that Guilding's *D. semistriolatum* does represent this very common shallow-water Antillean species. The shell is rather strongly and regularly curved, slender and regularly tapering, and has a round section. The color is translucent white with milky patches; it is highly polished and shining, with sometimes a reddish tint about the apex. Zigzag color bands of an opaque milky white encircle the shell, especially upon its sculptured portion, imparting a watered-silk appearance; this feature, however, varies considerably in degree of prominence. The sculpture consists of fine longitudinal, regularly spaced grooves engraved upon the posterior third, fourth, or fifth portion of the shell, the lines all abruptly ending at a given point, the balance of the shell surface being glistening and smooth but for slight irregularities of growth. There is a long, narrow apical slit on the side about midway between a convex side and concave side position. Many specimens do not show this character.

Dimensions vary within fairly broad limits; the extremes are:

Length, 34 mm.; diameter, 4 mm.; arc 3 (St. Thomas).
Length, 33 mm.; diameter, 2.5 mm.; arc, 2.5 (North Cuba).
Length, 25 mm.; diameter, 3 mm.; arc, 2 (St. Martin).

This is an abundant littoral species found throughout the Caribbean region, more especially in the Lesser Antilles. Lots in the National Museum collection are from Barbados, St. Martin, St. Thomas, Dominica, Varadero (Cuba), Bimini, also from the Florida Keys region, Tortugas to Miami, shore to 30 fathoms, and the west coast of Florida in shallow water. It has not, however, been reported from the Hatteras region.

The following are the National Museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	94378	Bermuda	(Goode.)
10	314462	North Bimini Island, *Eolis* Station 50	20 fms. (fragments).
4	314463	Varadaro Beach, Cuba, *Barrera* Station 213	(beach.)
1	95362	Samana Bay, St. Domingo (Dall)	
17	314464	St. Martin	
1	107711	St. Thomas (Pilsbry)	
1	314465	West Indies (Sowerby and Fulton)	
1	194635		
1	19725	Barbados	
1	19727	do	
1	314466	Off Miami, Florida, *Eolis* Station 49	30 fms., s. co. detr.
4	314467	Off Miami, Florida, *Eolis* Station 62	20 fms.
1	314468	Off Miami, Florida, *Eolis* Station 312	25 fms.
5	314469	Off Fowey Light, *Eolis* Station 8	25 fms.
1	314470	Off Fowey Light, *Eolis* Station 121	30 fms.
1	314471	Sand Key, Florida, *Eolis* Station 98	70–90 fms.
3	314472	Tortugas, Florida, *Eolis* Station 34	15 fms.
5	314473	Tortugas, Florida, *Eolis* Station, 33	(T. E. Benedict.)
2	194902	West Coast, Florida	
1	314474	Key West (North Florida), *Eolis* Station 20	7 fms.
1	194901	West Coast	10–12 fms. (T. E. Benedict).
2	314901	Habana, Cuba	Sanchez.

DENTALIUM (GRAPTACME) AMALIENSE, new species.

Plate 11, figs. 4, 5.

A lot of nine excellent specimens in the National Museum collection at first I had considered to be a small race of *Dentalium semistriolatum*. The particular form of that species occurring in St. Thomas is, however, rather larger and stouter than the average of specimens from elsewhere. These specimens, on the contrary, are hardly more than half the usual size of Guilding's species, and upon a critical comparison seem to lack certain characters necessary to link them even subspecifically. The shell is moderately and regularly curved, slender, regularly tapering, and has a round section. It is translucent to transparent, white in color, with a polished shining surface. It has no trace of the zigzag color bands. The sculpture consists of exceedingly fine longitudinal, regularly spaced grooves, engraved upon the posterior fourth or fifth of the shell, the sculpture disappearing into a smooth, glassy surface. A long narrow apical slit laterally placed is a feature that is not always observable even in apparently perfect specimens.

The measurements are:

Length, 16 mm.; diameter, 1.5 mm. (type).

Length, 17 mm.; diameter, 1.5 mm.

The type, Cat. No. 250088, U.S.N.M., is from St. Thomas, taken from a lot of nine specimens (Petit).

This species is distinguished from *Dentalium semistriolatum* by the relatively reduced space occupied by the sculptural features, by its smaller size, and by the absence of any trace of zigzag color markings. Its degree of curvature is also less. The lateral apical slit at once separates it from *D. eboreum*. Like *D. semistriolatum* it is probably a littoral species of the Antillean region, but of very restricted range.

DENTALIUM (GRAPTACME) SERICATUM Dall.

Plate 12, figs. 1, 6.

(?) 1834. *Dentalium semistriolatum* var. *b.* Guilding, Trans. Linn. Soc. London, vol. 17.

1881. *Dentalium sericatum* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 37

1889. *Dentalium sericatum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 423, pl. 26, fig. 1.

1889. *Dentalium sericatum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 1.

1897. *Dentalium* (*Graptacme*) *sericatum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 86, in part (not pl. 16, figs.), pl. 7, fig. 12.

1903. *Dentalium sericatum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 1.

This species in known by the type only. It is an immature shell, answering to the description of *Dentalium semistriolatum* except in being more slender and more delicately marked, the zigzag color zones of opaque white being especially bright and noticeable. It has no apical notch or slit. I suspect this to be a race of Guilding's species belonging properly to a shallower zone than that of 640 fathoms and normally possessed of a lateral apical slit. Until more material is at hand Doctor Dall's species had best not be disturbed. Doctor Dall has himself suggested that so small and sharp a shell might easily be caught in the meshes of the *Blake's* dredge net and remain some time before finally being dislodged and washed into the sieves. The following are the essentials of the description:

The shell is small, thin, slightly curved, rather rapidly enlarging with round section. The color is a translucent white, with opaque white wavy lines encircling the shell, with zigzag markings and producing an effect suggestive of *moire antique* silk. The sculpture is of fine sharp close-set longitudinal grooves with narrower spaces between—36 in the middle and about 50 at the oral end. The apertures are simple and featureless.

The type, Cat. No. 203191, U.S.N.M., is a juvenile shell and unique specimen and measures—length, 13 mm.; diameter, 1.2 mm. It was dredged by the *Blake*, station not given, in 640 fathoms, off Yucatan Bank.

DENTALIUM (GRAPTACME) CALAMUS Dall.

Plate 12, figs, 7, 8.

1889. *Dentalium calamus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 421.
1889. *Dentalium calamus* Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1892. *Dentalium calamus* Dall, Trans. Wagner Free Inst. Phila., vol. 3, pt. 2, p. 440.
1897. *Dentalium* (*Graptacmè*) *calamus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 16, p. 97, pl. 16, figs. 55–59.
1903. *Dentalium calamus* Dall, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is slender, slightly curved, evenly and regularly increasing in diameter from a rather blunt posterior end. The color is a translucent white, surface rather polished and vitreous in the anterior portion. It is longitudinally grooved for the greater part of its adult length with uniform regular lines, about 16 to the millimeter, all rather abruptly terminating and leaving the balance of the shell smooth. The relative portions of sculptured and smooth surface are somewhat variable, depending upon the amount of tip lost and age of specimens. The posterior aperture is filled with a slit plug, obliqely planed down on the convex side and therefore showing more of the slit at the dorsal side. The apical plug is polished and seems to form an integral part of the original shell, and not to be a casual feature like the projecting tube so frequently seen in certain other species heretofore considered. The phallic appearance presented by this slit plug is very striking and is unknown in any other species from the faunal areas under consideration. Specimens measure:

Length, 19.5 mm.; diameter, 1.25 mm.; arc, 1.25 (type).
Length, 26 mm.; diameter, 2.1 mm.; arc, 1.5 (Cape Cajon, Cuba).
Length, 24.5 mm.; diameter 1.75 mm.; arc, 1.25 (Porto Rico).

The type, Cat. No. 68117, U.S.N.M., was collected by Commander Rush United States Navy, in Turtle Harbor, Florida, in 4 fathoms.

Specimens from off Cape Fear and Frying Pan Shoals are in the Philadelphia Academy of Sciences collection. The most southern record is of specimens from Barbados, in the State University of Iowa collection. It is a species of very shallow water range.

The lots in the museum collection are as follows:

Number of specimens.	Cat. No. U. S. N. M.	Locality.	Remarks.
7	314475	Miami, Florida, *Eolis* Station 85	6 fms.
1	314476	Miami, Florida, *Eolis* Station 93	18–25 fms.
6	314477	Miami, Florida, *Eolis* Station 83	3 fms.
27	314478	Off Fowey Light, *Eolis* Station 88	6 fms.
[1] 5	68117	Turtle Harbor	4 fms. (Rush.)
16	314479	Couch Key, *Eolis* Station 64	1–5 feet.
19	314480	South Bimini Island, *Eolis* Station 72	Shore drift (mostly fragments).
13	314481	South Cat Cay, Bahamas, *Eolis* Station 47	3 fms.
5	314482	Off Arroyos, northwest Cuba, *Barrera* Station 206	
2	314483	Cape San Antonio, Cuba, *Barrera* Station 224	
10	314484	Cape Cajon, Cuba, *Barrera* Station 211	
1	161579	Mayaguez, Porto Rico, U. S. B. F. Station 60–61	12 fms.

[1] Type.

Subgenus LAEVIDENTALIUM Cossman, 1888.

1888. *Laevidentalium* COSSMAN, Ann. de la Soc. Royal de Malac. de Belgique, vol. 25, p. 9.

1897. *Laevidentalium*, PILSBRY and SHARP, Tryon's Manual of Conchology, vol. 17, p. 97.

Shell smooth or showing growth lines only; wholly without longitudinal sculpture. Slightly oval or round section. The apex is simple, as defined by Cossman, or with Antalis-like notch on the convex side, as expanded by Pilsbry and Sharp.

Cossman's subgenus was created for a fossil group of smooth shells showing no apical features. Pilsbry and Sharp are fully justified in including certain recent species showing the conventional apical features of *Antalis*. The essence of the characters for the group lies in the wholly sculptureless shell which is even smooth on the tip.

KEY TO THE SPECIES OF THE SUBGENUS LAEVIDENTALIUM.

Very strongly curved .... *callipeplum*, page 74.
Not very strongly curved.
  Shell slender.
    Very long (over 50 mm.) .... *perlongum*, page 75.
    Not very long (under 50 mm.) .... *liodon*, page 76.
      Apical notch on convex side .... *liodon liodon*, page 76.
      Apical notch on concave side .... *liodon alloschismum*, page 77.

DENTALIUM (LAEVIDENTALIUM) CALLIPEPLUM Dall.

Plate 12, fig. 5.

1889. *Dentalium callipeplum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 419, pl. 27, fig. 12 (*b*).

1889. *Dentalium callipeplum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 12 (*b*).

1892. *Dentalium callipeplum* Dall, Trans. Wagner Free Inst. Phila., vol. 3, pt. 2, p. 442.

1897. *Dentalium* (*Laevidentalium*) *callipeplum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 100, pl. 19, fig. 9.

1901. *Dentalium callipeplum* Dall and Simpson, Bull. U. S. Fish Comm. for 1900, vol. 1, p. 456.

1903. *Dentalium callipeplum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 12 (*b*).

The shell is strongly, evenly curved like a scimitar and rather rapidly increasing in diameter, thin but strong; its section is round. In color it is ivory or cream white, with some translucent patches, and occasionally reflects a salmon tint on the tip and in the posterior portion. The surface is very highly polished and shining. It is entirely sculptureless; some growth lines appear as mere scratches, but are difficult to distinguish on the glistening vitreous surface. A shallow apical notch on the concave side is faintly indicated. It measures—length, 62 mm.; diameter, 5 mm.; arc 7 (type). The size is very uniform; the other museum specimens which measure less are smaller only because younger.

The type, Cat. No. 94064, U.S.N.M., is from the U. S. B. F. Station 2400, between the Mississippi River delta and Cedar Keys, in 169 fathoms, gray mud, no temperature record given.

This is a very striking shell, with a conspicuously high degree of curvature, exceptionally brilliant glistening surface, and notable for its ivory cream white color rather than the more usual bluish white of most other species of *Dentalium*. These features, combined with the total absence of any sculpture, make it easily recognized.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 5	94064	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2400	169 fms., gy. m.
1	95361	Santa Lucia, U. S. B. F. Station 220	116 fms., 58.5°, r.
1	224976	St. Kitts, U. S. B. F. Station 149	61 fms., fne. s. br. sh., 76°.
1	323903	Off Cape San Blas, Florida, U. S. B. F Station 2402	111 fms., gn. m.
2	161578	Mayaguez, Porto Rico, U. S. B. F. Station 6062	25 fms., s. m. sh., 75 8°.

[1] Type.

DENTALIUM (LAEVIDENTALIUM) PERLONGUM Dall.

Plate 9, fig. 1.

1878. *Dentalium perlongum* Dall, Bull. Mus. Comp. Zool., vol. 5, No. 6, p. 61 (name only).
1881. *Dentalium perlongum* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 36.
1888. *Dentalium perlongum*, Agassiz, Three Cruises of the *Blake*, vol. 2, p. 76, fig. 284.
1889. *Dentalium perlongum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 419, pl. 27, fig. 6.
1889. *Dentalium perlongum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 6.
1889. *Dentalium perlongum* Dall, Proc. U. S. Nat. Mus., vol. 12, p. 294.
1897. *Dentalium* (*Laevidentalium*) *perlongum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 104, pl. 18, figs. 10, 11.
1903. *Dentalium perlongum* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 6.

The shell is extremely long and slender, but slightly arched or almost straight, thin but strong, slowly and regularly increasing in diameter, with round section, and possessing a long needle-like tip. It is opaque white, with a glossy, rather porcellanous but not highly polished surface. Dead specimens take on a light brownish gray or slate color. It is wholly sculptureless, save for some excessively fine longitudinal scratches on the tip and posterior portion, only observable by aid of a lens but more often lacking even in perfectly fresh specimens. Otherwise it is a perfectly smooth cylinder barring the unimportant growth irregularities. A shallow to rather deep apical notch on the convex side is present in normal specimens. The measurements are:

Length, 90 mm.; diameter, 3.75 mm.; arc, 2 (tip gone).
Length, 54 mm.; diameter, 3 mm.; arc, 1.2 (tip gone).

A perfect adult specimen would exceed 100 mm. in length, with a diameter of under 4 mm.

The type is not in United States National Museum collection.

A defective specimen from 20 fathoms southeast of Cape St. Roque, Brazil, and some fragments from off Rio de la Plata, in 11½ fathoms, seem to be referable to this species.

The extreme length, slenderness, and straightness of this shell set it apart from any other species of the western Atlantic.

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
9	94182	Off Cape Hatteras, U. S. B. F. Station 2117	683 fms., yl. m. fne. s., 39°.
1	83803	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2384.	940 fms., gy. m., 39.6°.
17	93775	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2383.	1,181 fms., br. gr. m., 39.8°.
3	93149	do	Do.
7	223660	do	Do.
2	103471	Gulf of Mexico, U. S. B. F. Station 2381	1,330 fms., lt. br. m.
2	95356	St. Vincent, U. S. B. F. Station 226	424 fms., fne. dk. s., 42.5°.
14	87552	South of St. Kitts, U. S. B. F. Station 2751	687 fms., oz., 39.9°.
2	330760	do	687 fms., bu. glob. oz., 39.9°.
15	87554	East of Tabago, U. S. B. F. Station 2754	880 fms., 37.9°, glob. oz.
1	95357	Grenada, West Indies, U. S. C. S. Station 244	792 fms., gy. oz., 39°.
2	95359	Guadeloupe, U. S. C. S. Station 163	769 fms., 40° oz. s.
2	95358	Guadeloupe, U. S. C. S. Station 162	734 fms., 40° lava s.
2	96599	North of Ceara, Brazil, U. S. C. S. Station 2760	1,019 fms., 39.4° br. co.
1	203106	Cape St. Roche, U. S. C. S. Station 2758	20 ms., br. sh.
2	330835	Off Rio de la Plata, U. S. C. S. Station 2764	11½ fms., s. sh. brk.

DENTALIUM (LAEVIDENTALIUM) LIODON **Pilsbry and Sharp.**

1897. *Dentalium* (*Laevidentalium*) *liodon* PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 107, pl. 21, figs. 37–39.

The shell is moderately curved, rather slender, thin but strong, with a subcircular aperture, a little dorso-ventrally compressed. Color bluish white, subtranslucent, but more opaque in the middle portion; the surface is brilliantly polished. It is sculptureless, save for occasional circular grooves indicating growth lines. A narrow V-shaped apical notch on the convex or the concave side, or even more or less laterally placed, is a peculiarly variable feature.

The type, in the Philadelphia Academy of Sciences, is from St. Martin (E. Marie) and measures—length, 25.3 mm.; diameter, 2 mm.

This species may be at once distinguished from *Dentalium callepeplum* by its smaller size and lesser degree of curvature, from *D. perlongum* by its shorter shell. *D. liodon* is a shallow to moderately deep water mollusk.

DENTALIUM (LAEVIDENTALIUM) LIODON LIODON **Pilsbry and Sharp.**

Plate 12, figs. 2, 3, 4.

The description of this, the typical subspecies of *Dentalium liodon*, coincides with that of the species itself, with the restriction, however, to those forms only that have the apical notch on the convex side.

The type, which is in the Philadelphia Academy of Sciences, is the same as of *D. liodon* and measures—length, 25.3 mm.; diameter, 2 mm.

The museum lots are: One specimen, Cat. No. 61188, U.S.N.M., was collected by C. T. Simpson in Honduras, and is a beach shell; one specimen, Cat. No. 19729, U.S.N.M., from Barbados; one specimen, Cat. No. 341902, U.S.N.M., was taken by the State University of Iowa Expedition of 1918 at their station 49, off Bridgetown, Barbados, in 80 fathoms; one specimen, Cat. No. 314903, U.S.N.M., from the same expedition, at their station 116, in 200 fathoms, off English Harbor, Antigua.

DENTALIUM (LAEVIDENTALIUM) LIODON ALLOSCHISMUM Pilsbry and Sharp.

Plate 13, figs. 1, 4, 5, 6.

1897. *Dentalium (Laevidentalium) liodon* "variety?" *alloschismum* Pilsbry and Sharp, Tryon's Man. of Conch., vol. 17, p. 108, pl. 21, figs. 40, 41, 42.

The shell differs from *Dentalium liodon liodon* only in the position of the apical notch, which here may be on the concave side or more or less laterally placed, and also by its circular section. Doctors Pilsbry and Sharp questioned the value of the subspecies. A larger series of specimens for study would likely disprove the need of any subspecies under *D. liodon.*

The type, which is in the collection of the Philadelphia Academy of Sciences, is from St. Martin, in the West Indies, and measures—length, 24.5 mm.; diameter, 1.9 mm. Another specimen is length, 27.5 mm.; diameter, 2.2 mm.

There are no examples in the National Museum collection.

Subgenus EPISIPHON Pilsbry and Sharp, 1897.

1897. *Episiphon* Pilsbry and Sharp, Tryon's Man. of Conch., vol. 17, p. 177.

Shells are very small, slender, and rather straight, needle-shaped, slightly tapering, thin and fragile, glossy and smooth, and without longitudinal sculpture. The apex has a projecting "pipe" or is a simple orifice with no slit or rarely a notch.

This subgenus was created to include a group of very small needle-like *Dentalia,* wholly lacking in any longitudinal sculpture, and possessing to a marked degree a projecting thin tube from the posterior orifice, after the tip is destroyed or lost. This last feature is likely not a biologic one and is by no means confined to this particular subgenus, but it does seem to be a very striking characteristic of the only species of the subgenus occurring in the western Atlantic. Only one species, *Dentalium sowerbyi,* with its two subspecies, *D. s. sowerbyi* and *D. s. pelliceri,* occur within the faunal areas under consideration.

KEY TO THE SUBSPECIES OF THE SUBGENUS EPISIPHON.

Surface coarser, less transparent, American……………………*D. s. sowerbyi,* page 79.
Surface smoother, more transparent, Cuban……………………*D. s. pelliceri,* page 80.

DENTALIUM (EPISIPHON) SOWERBYI Guilding.

1834. *Dentalium sowerbyi* Guilding, Trans. Linn. Soc. London, vol. 17, p. 35, pl. 3, fig. 7.

(?)1860. *Dentalium filum* Sowerby, Thesaurus Conch., vol. 3, p. 89, pl. 225, fig. 45.

(?)1860. *Dentalium fistula* Sowerby, Thesaurus Conch., vol. 3, p. 99, pl. 225, fig. 62.

(?)1870. *Dentalium gracile* JEFFREYS, Ann. and Mag. Nat. Hist., ser. 4, vol. 6, p. 74.
(?)1880. *Dentalium gracile* JEFFREYS, Ann. and Mag. Nat. Hist., ser. 5, vol. 6, p. 317.
1889. *Dentalium filum*, DALL, Bull. Mus. Comp. Zool., vol. 18, p. 419.
1889. *Dentalium filum*, DALL, Bull. 37, U. S. Nat. Mus., p. 76.
1892. *Dentalium filum*, DALL, Trans. Wagner Free Inst., Phila., vol. 3, p. 44.
(?)1896. *Dentalium filum*, CLESSIN, Conchylien Cab., vol. 6, pt. 5, p. 8, pl. 4, fig. 5.
(?)1896. *Dentalium fistula*, CLESSIN, Conchylien Cab., vol. 6, pt. 5, p. 22, pl. 6, fig. 10.
1897. *Dentalium sowerbyi*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 117, pl. 20, fig. 30.
(?)1897. *Dentalium fistula*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 118, pl. 18, fig. 4.
1897. *Dentalium filum*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 118, pl. 18, fig. 9, in part.
1903. *Dentalium filum*, DALL, Bull. 37, U. S. Nat. Mus., p. 76 (not *D. sowerbyi* Chenu, Conch., Ill., p. 7, pl. 6, fig. 2) (not *D. filum*, Dall and Simpson, Bull. U. S. Fish Comm., for 1900, vol. 1, p. 456).

The shell is very small and slender, of round section, thin, but not fragile, moderately and regularly curved, slowly and regularly increasing in diameter. In texture it is vitreous, either transparent, or merely translucent on account of being clouded by more or less opaque rings. The color is white, occasionally tinged with salmon. There is no trace of longitudinal sculpture. Many rings of growth closely crowded together upon the transparent tips are often observable under a lens. Slight irregularities of growth prevent the surface from being perfectly smooth, and therefore less polished than in many vitreous species, but a Cuban form is absolutely smooth and glistening. The apex is generally squarely cut across and from the orifice projects a very thin inner tube. There is no apical notch or slit. Measurements are:

Length, 13 mm.; diameter, 1.5 mm.; arc, 0.5 to 1.

Hatteras region, in 17 to 124 fathoms; Florida Keys region, 8 to 180 fathoms; Gulf of Mexico, 60 to 85 fathoms; Cuba, Barbados. It is probably widely distributed throughout the entire Antillean region in shallow to moderate depths.

Known in American collections as "*Dentalium filum* Sowerby," the name chosen by Doctor Dall in the *Blake* report for various lots from the Hatteras region. Sowerby's *D. filum* and *D. fistula* and Jeffrey's *D. gracile* were all described from east Atlantic localities, and their identity with our species is very questionable. Guilding's *D. sowerbyi* antidates all others, and was, moreover, described from the Caribbean. Although inadequately described, there can be no doubt it is the species under consideration.

DENTALIUM (EPISIPHON) SOWERBYI SOWERBYI Guilding.

Plate 13, figs. 2, 3, 10.

This, the typical subspecies, includes all specimens answering the general description given of *Dentalium sowerbyi*, excluding only the highly polished, perfectly smooth, and transparent form which finds its habitat in certain Cuban waters. This subspecies presents a shell of somewhat coarser surface, rendered translucent rather than transparent by reason of an uneven deposit of the shell material during growth. The shells are rather thicker and less delicate than the *D. s. pelliceri* next considered.

The measurements are the same as given for *D. sowerbyi*.

The many lots in the United States National Museum collection, as shown in the table below, are from the American continental shelf zone from Hatteras south to the Gulf of Mexico, and then from Barbados. Further research in Antillean waters will likely fill in the great gap.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
6	93106	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2592.	120 fms., 58°, fne. gy. s.
7	92831	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2601.	107 fms., 67.4°, gy. s. p.
100+	93107	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2595.	63 fms., 75°, gy. s. brk. sh.
30	329527	do	63 fms., 75°, gy. s. brk. sh.
4	329947	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2602.	124 fms., 61°, s. r.
28	329903	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2600.	87 fms., 71.5°, fne. gy. s.
33	93109	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2602.	124 fms., 61°, s. r.
16	93108	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2596.	49 fms., 79°, gy. s.
12	93110	Off Cape Fear, North Carolina, U. S. B. F. Station 2616.	17 fms., s. p.
80+	314486	Miami, Florida, *Eolis* Station 48	60 fms., g. m.
10	314487	Miami, Florida, *Eolis* Station 51	24 fms.
4	314488	Miami, Florida, *Eolis* Station 87	63 fms.
30	314489	Miami, Florida, *Eolis* Station 69	38 fms.
1	314490	Miami, Florida, *Eolis* Station 86	58 fms.
16	314491	Miami, Florida, *Eolis* Station 115	100 fms.
4	314492	Miami, Florida, *Eolis* Station 116	65 fms.
13	314493	Miami, Florida, *Eolis* Station 113	18–20 fms.
33	314494	Miami, Florida, *Eolis* Station 82	83 fms.
1	314495	Miami, Florida, *Eolis* Station 62	20 fms.
8	314496	Miami, Florida, *Eolis* Station 49	30 fms., s. brk. c.
1	314497	Miami, Florida, *Eolis* Station 118	30 fms.
8	314498	Off Miami, Florida, *Eolis* Station 68	45 fms.
13	314499	Off Miami, Florida, *Eolis* Station 67	50 fms.
1	314500	Off Miami, Florida, *Eolis* Station 77	8 fms.
15	314501	Off Miami, Florida, *Eolis* Station 93	18–25 fms.
5	314502	Off Miami, Florida, *Eolis* Station 122	30 fms.
6	314503	Off Miami, Florida, *Eolis* Station 95	90 fms.
1	314504	Off Miami, Florida, *Eolis* Station 124	35 fms.
20	314505	Off Miami, Florida, *Eolis* Station 117	35–38 fms.
3	314506	Off Miami, Florida, *Eolis* Station 94	42 fms.
19	314507	Off Miami, Florida, *Eolis* Station 140	65 fms.
9	314508	Off Fowey Light, Florida, *Eolis* Station 177	60 fms.
50+	314509	Off Fowey Light, Florida, *Eolis* Station 364	75–90 fms.
2	314510	Off Fowey Light, Florida, *Eolis* Station 152	40 fms.
35	314511	Off Fowey Light, Florida, *Eolis* Station 142	40 fms.
5	314512	Off Fowey Light, Florida, *Eolis* Station 119	23 fms.
3	314513	Off Fowey Light, Florida, *Eolis* Station 127	42 fms.
20	314514	Off Fowey Light, Florida, *Eolis* Station 183	80 fms.
100	314515	Off Fowey Light, Florida, *Eolis* Station 351	90 fms.
100+	314516	Off Fowey Light, Florida, *Eolis* Station 352	90 fms.
2	314517	Off Fowey Light, Florida, *Eolis* Station 128	60 fms.
10	314518	Off Fowey Light, Florida, *Eolis* Station 121	30 fms.
8	314519	Off Fowey Light, Florida, *Eolis* Station 149	28 fms.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
15	314520	Off Fowey Light, Fla., *Eolis* Station 169	70 fms.
40	314521	Off Fowey Light, Fla., *Eolis* Station 356	55 fms.
10	314522	Off Fowey Light, Fla., *Eolis* Station 123	22 fms.
2	314523	Off Fowey Light, Fla., *Eolis* Station 155	43 fms.
1	314524	Off Fowey Light, Fla., *Eolis* Station 107	40-50 fms.
75	314525	Off Fowey Light, Fla., *Eolis* Station 355	70 fms.
3	314526	Off Fowey Light, Fla., *Eolis* Station 105	40 fms.
50	314527	Off Fowey Light, Fla., *Eolis* Station 353	85 fms.
9	314528	Off Fowey Light, Fla., *Eolis* Station 174	58 fms.
2	314529	Off Fowey Light, Fla., *Eolis* Station 108	38 fms.
6	314530	Off Fowey Light, Fla., *Eolis* Station 144	45 fms.
2	314531	Off Fowey Light, Fla., *Eolis* Station 151	55 fms.
8	314532	Off Fowey Light, Fla., *Eolis* Station 90	44 fms.
50+	314533	Off Fowey Light, Fla., *Eolis* Station 354	80 fms.
30	314534	Off Fowey Light, Fla., *Eolis* Station 362	95 fms.
30+	314535	Off Fowey Light, Fla., *Eolis* Station 374	85 fms.
25	314536	Off Fowey Light, Fla., *Eolis* Station 361	75-100 fms.
50+	314537	Off Fowey Light, Fla., *Eolis* Station 373	70-90 fms.
7	314538	Off Fowey Light, Fla., *Eolis* Station 363	85 fms.
33+	314539	Off Fowey Light, Fla., *Eolis* Station 375	75-90 fms.
2	314540	Off Fowey Light, Fla., *Eolis* Station 153	
8	97179	Off Cape Florida, Florida, U. S. B. F. Station 2646.	85 fms., gy. s. form.
12	151983	.....do	85 fms., gy. s. form.
5	151990	.....do	85 fms., gy. s. form.
13+	314541	Off Cape Florida, *Eolis* Station 189	67 fms.
27	314542	Off Ragged Key, Florida, *Eolis* Station 193	80 fms.
7	314543	Off Ragged Key, Florida, *Eolis* Station 192	75 fms.
50+	314544	Off Ragged Key, Florida, *Eolis* Station 366	75-90 fms.
25+	414545	Off Turtle Harbor, Florida, *Eolis* Station 58	50 fms.
3+	314546	Off Turtle Harbor, Florida, *Eolis* Station 61	40 fms.
100+	314547	Off Caeser's Creek, Florida, *Eolis* Station 376	90 fms.
2+	314548	Off Long Reef, Florida, *Eolis* Station	38 fms.
35+	314549	Off Triumph Reef, Florida, *Eolis* Station 350	70-90 fms.
50+	314550	Off Ajax Reef, Fla., *Eolis* Station 369	80-100 fms.
50+	314551	Off Ajax Reef, Florida, *Eolis* Station 370	70-90 fms.
11+	314552	Straits of Florida, U. S. B. F. Station 2639-47	50-250 fms.
7	330427	Off Carysfort Reef, U. S. B. F. Station 2641	60 fms., co. s., 69.2°.
1	314553	Off Sambo Reef, *Eolis* Station 197	75 fms.
5	314554	Off Sambo Reef, *Eolis* Station 195	50 fms.
16	314555	Off Key West, Florida, *Eolis* Station 42	60 fms.
50	314556	Off Key West, Florida, *Eolis* Station 3	63 fms.
11	314557	Off Key West, Florida, *Eolis* Station 63	78 fms.
11	314558	Off Sand Key, Florida, *Eolis* Station 300	72 fms.
2	314559	Off Sand Key, Florida, *Eolis* Station 161	76 fms.
7	314560	Off Sand Key, Florida, *Eolis* Station 162	78 fms.
40	314561	Off Sand Key, Florida, *Eolis* Station 56	70 fms.
20	314562	Off Sand Key, Florida, *Eolis* Station 98	79-90 fms.
2	314563	Off Sand Key, Florida, *Eolis* Station 32	61 fms.
3	314564	Off Sand Key, Florida, *Eolis* Station 160	62 fms.
3	323758	Off Mobile, Ala., U. S. B. F. Station 2389	27 fms., gy. s. brk. sh.
20	151884	Between Mississippi Delta and Cedar Key, Station U. S. B. F., 2404.	60 fms., gy. s.
13	151875	.....do	60 fms., gy. s.
25	323945	.....do	60 fms., gy. s.
2	323215	Off Cape San Blas, Florida., U. S. B. F. Station 2369	26 fms., crs. gy. s. brk. sh.
21	314826	Sand Key, Florida, *Eolis* Station 100	65 fms.
34	314827	Fowey, Florida, *Eolis* Station 382	70 fms.
2	314828	Fowey, Florida, *Eolis* Station 360	100 fms.
1	314829	Pelecan Island, Barbados, S. U. I. Exp. Station 51.	33 fms.
1	314830	Barbados, S. U. I. Exp. Station 51	90 fms.
1	314831	Needham Point, Barbados, S. U. I. Exp. Station 3.	25-40 fms.
1	314836	Barbados, S. U. I. Exp. Station 72	90 fms., sand.
80	314904	Barbados, S. U. I. Exp. Station 40	90 fms.

DENTALIUM (EPISIPHON) SOWERBYI PELLICERI, new subspecies.

Plate 13, figs. 7, 8, 9.

A number of lots of *Dentalium sowerbyi* taken by the *Barrera* Expedition on the northwest coast of Cuba from littoral stations within the Colorados Reefs are of shells thinner, more transparent, and more noticeably of a salmon tint, and with a smoother polished surface than in the typical subspecies. As these live in protected waters they preserve their tips, thus appearing to be more slender. This is one of the most beautiful of the smaller *Dentalia*, and I am glad to dedicate it to the captain of the *Tomas Barrera*, Gaspar Pellicer.

The type, Cat. No. 314565, U.S.N.M., was dredged in the harbor of Bahia Honda, Cuba in 1 to 12 fathoms. It measures—length, 11.5 mm.; diameter, 0.9 mm.; tip preserved.

Another specimen from the same lot with tip lost, but with a projecting "pipe", measure—length, 14.5 mm., diameter, 0.95 mm. There are in the National Museum collection eight lots from within the Colorados Reefs, Cuba; one from off Sand Key, Florida, 65 fathoms; and one from Cape Catoche, Yucatan, in 25 fathoms.

The following are the National Museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
75	314565	Bahia Honda, Cuba, *Barrera* Station 208	1–12 fms.
85	314566	Punta Colorado, northwest Cuba, Station 207	2–3 fms.
100	314567	Cabanas Harbor, northwest Cuba, Station 203	3–12 fms.
5	314568	Cayo Arenas, northwest Cuba, Station 204	2 fms.
27	341569	Santa Rosa, northwest Cuba, Station 209	3–6 fms.
3	314570	Cape Cajon, northwest Cuba, Station 211	
2	314571	Sand bar, off Arroyos, Cuba, Station 206	
6	314572	Esperanza, Cuba, Station 210	2–3 fms.
1	314573	Cape Catouche, Yucatan, U. S. B. F. Station 2361.	25 fms.
50+	314573	Santa Lucia, northwest Cuba, *Barrera* Station 200.	2–4 fms.

Subgenus BATHOXIPHUS Pilsbry and Sharp, 1897.

1897. *Bathoxiphus* PILSBRY and SHARP, Tryon's Man. Conch., vol. 16, p. 121.

The shell is thin, conspicuously compressed laterally and nearly smooth; it has a broad apical slit on the convex side.

Lateral compression, at least when carried to a noticeable degree, is very unusual among the *Dentalia*. The subgenus contains but two well-defined species and a possible third.

KEY TO THE SPECIES OF THE SUBGENUS BATHOXIPHUS.

Keeled on both convex and concave sides	*ensiculus*, page 81.
Keeled on convex side only	*didymum*, page 83.

DENTALIUM (BATHOXIPHUS) ENSICULUS Jeffreys.

Plate 14, figs. 1, 4, 5, 7, 9.

1877. *Dentalium ensiculus* JEFFREYS, Ann. and Mag. Nat. Hist., ser. 4, vol. 19, p. 154.

1881. *Dentalium sigsbeanum* DALL, Bull. Mus. Comp. Zool., vol. 9, p. 38.

1882. *Dentalium ensiculus* JEFFREYS, Proc. Zool. Soc., p. 660, pl. 49, fig. 4.

1885. *Dentalium ensiculus*, WATSON, *Challenger* Report (Scaphopoda), p. 12, pl. 2, fig. 2.

1885. *Dentalium ensiculus*, VERRILL, Trans. Conn. Acad. of Arts and Sci., vol. 6, p. 432.

1889. *Dentalium ensiculus*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 428, pl. 27, fig. 12.

1889. *Dentalium ensiculus*, Dall, Proc. U. S. Nat. Mus., vol. 12, p. 294.

1897. *Dentalium ensiculus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 121, pl. 7, figs. 7–10.

1903. *Dentalium ensiculus*, Dall, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is fairly strongly arched, with chief curvature in its posterior third. It is slowly, regularly increasing in diameter, decidedly flattened laterally, and has a more or less sharp keel developed on both the convex and concave sides, becoming, however, less sharply angular near the anterior aperture in adult specimens. Occasionally a bluntly angulated keel appears on the flattened sides. The aperture is a flattened oval. The color is grayish white, the slightly roughened surface is of an oily appearance rather than polished; the shell is either translucent or quite opaque. No sculpture is present, but some concentric lines of growth are more or less prominent. There is a very wide square apical notch on the convex side, which is over half the diameter of the tip.

Measurements are:

Length, 30 mm.; greater diameter, 3 mm.; lesser diameter, 2 mm.; arc, 2.2 (Georges Bank).

Length, 31 mm.; greater diameter, 2 mm.; lesser diameter, 1.25 mm.; arc, 2.25 (St. Vincent).

Length, 19 mm.; greater diameter, 1.5 mm.; lesser diameter, 1 mm.; arc, 1.8 (Yucatan).

Variations are to be noted in size and in the degree of sharpness of keels. Antillean specimens are somewhat more slender. Northern specimens are usually more chalky and less compact in texture. I can not separate these American shells from the east Atlantic specimens in the Jeffreys collection.

It is a deep-water species of probably very considerable geographic range on the ocean floor. West Atlantic records in the National Museum collection are as follows:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
2	52083	Georges Banks, U. S. B. F. Station 2570	1,813 fms., 37°, glob. oz.
12	78621	Off Nantucket, U. S. B. F. Station 2714	1,825 fms., br. oz.
2	78622	Off Nantucket, U. S. B. F. Station 2715	1,753 fms., br. oz.
2	78620	Off Nantucket, U. S. B. F. Station 2713	1,859 fms., br. oz.
1	78623	Off Delaware, U. S. B. F. Station 2716	1,631 fms., br. oz. form.
1	108165	Off Fernandina, Florida, U. S. B. F. Station 2668.	294 fms., 46.3° gy. s. del. co.
1	87535	Off Cape Florida, Florida, U. S. B. F. Station 2644.	193 fms., s., 43.4° gy. s.
1	323776	Off Cape San Blas, Florida, U. S. B. F. Station 2399.	196 fms., gy. m. 51.6.
1	94293	Off Habana, Cuba (?)	1,024 fms. (Rush).
1	95347	Yucatan Strait *Blake* Station	640 fms.
16	95355	St. Vincent, West Indies, *Blake* Station 240	464 fms.
2	203108	Off St. Barts, U. S. B. F. Station 2750	496 fms., 44.4°.

DENTALIUM (BATHOXIPHUS) DIDYMUM Watson.

Plate 14, fig. 10.

1879. *Dentalium didymum* WATSON, Journ. Linn. Soc. London, vol. 14, p. 517.
1885. *Dentalium didymum* WATSON, *Challenger* Report (Scaphopoda), p. 10, pl. 1, fig. 11.
1897. *Dentalium enciculus didymum*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 123, pl. 7, fig. 20.

The shell is extremely attenuated, slightly curved, and a little flattened laterally, especially toward the convex curve, giving a trigonal section rather than that of a flattened oval. It is porcellanous in texture, of a brilliant surface, and pure white in color. It is sculptureless but for "faint indications of longitudinal texture," and some very fine encircling growth lines. No apical features are noted in Watson's description.

The type measures—length, 1.08 inches; diameter, 0.6 inch (27.43 mm. by 1.52 mm.). The type was taken at *Challenger* Station 24, north of Culebra Island, in 390 fathoms, and is in the British Museum.

I have seen no authentic specimens. The diagnosis indicates a shell belonging to the group of *Dentalium ensiculus*, but hardly to be united to it even as a subspecies. A poor specimen in the National Museum collections from Cape Catoche, Yucatan, Cat. No. 314575, U.S.N.M., 25 fathoms, is possibly referable to this species; also three fragmentary specimens from Barbados, Cat. No. 314905, U.S.N.M., taken by the State University of Iowa Expedition at their station 6, in 100 fathoms; also one young specimen, Cat. No. 314906, U.S.N.M., from the State University of Iowa Expedition Station 2, Carlisle Harbor, Barbadoes, in 12 fathoms.

In these shells the apical features are indicated as a broad square notch on the convex side.

Subgenus COMPRESSIDENS Pilsbry and Sharp, 1897.

1897. *Compressidens* PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 123.

The shell is small, decidedly tapering, conspicuously compressed between the convex and concave sides; weakly sculptured, nearly smooth, with its apical orifice simple without either slit or notch.

KEY TO THE SPECIES OF THE SUBGENUS COMPRESSIDENS.

Shell strongly compressed; no constriction of caliber; moderately curved. *pressum*, page 83.

Shell not strongly compressed; constriction of caliber; considerably curved. *ophiodon*, page 84.

DENTALIUM (COMPRESSIDENS) PRESSUM Pilsbry and Sharp.

Plate 14, figs. 3, 6, 8.

1879. *Dentalium compressum* WATSON, Journ. Linn. Soc. London, vol. 14, p. 516 (not Orbigny, 1850).
1881. *Dentalium compressum*, DALL, Bull. Mus. Comp. Zool., vol. 9, p. 38.
1885. *Dentalium compressum* WATSON, *Challenger* Report (Scaphopoda), p. 9, pl. 1, fig. 9.

1889. *Dentalium compressum*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 426.
1889. *Dentalium compressum*, Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1897. *Dentalium* (*Compressidens*) *pressum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 124, pl. 7, fig. 11; pl. 22, figs. 50–52.
1903. *Dentalium compressum*, Dall, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is strongly compressed or flattened on both the convex and concave sides; the lateral sides are not actually carinated but subangular. There is no contraction at the anterior aperture. It is moderately and regularly curved, rather quickly increasing in girth, thin but strong, and with an oval section. The color is white, with surface scarcely shining, the shell varying from translucent to rather opaque. Some faint longitudinal wrinkles are sometimes observable on the tip with shallow spaces between; irregular, densely crowded growth lines encircle the shell, coarsening the otherwise smooth surface. No apical notch or slit is present. Measurements are:

Length, 12 mm.; greater diameter, 2 mm.; lesser diameter, 1.75 mm. (Pilsbry).

Length, 11.25 mm.; greater diameter, 1.5 mm.; lesser diameter, 1.25 mm. (type).

Length, 17 mm.; greater diameter, 2 mm.; lesser diameter, 1.5 mm. (Tortugas).

This is an antillean continental slope species, reaching north to the Florida Keys region within the Gulf Stream. The type is from off Culebra Island, West Indies, in 390 fathoms, dredged by the *Challenger*.

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
6	314576	Fowey Light, Florida, *Eolis* Station 303	135 fms.
4	314577	Fowey Light, Florida, *Eolis* Station 306	100 fms.
7	330526	Off Cape Florida, U. S. B. F. Station 2644	193 fms., gy. s., 43.4°.
2	314578	Fowey Light, Florida, *Eolis* Station 349	100-150 fms.
2	314579	Fowey Light, Florida, *Eolis* Station 348	110 fms.
1	94094	Between Mississippi Delta and Cedar Keys, U. S. B. F. Station 2402.	111 fms., 97m.
6	323777	Off Cape San Blas, Cedar Keys, U. S. B. F. Station 2399.	196 fms., gy. m., 51.6°.
7	95342	South of Tortugas, *Blake* Station 43	339 fms., 45°.
1	95341	Off Cape San Antonio, Station 43	413 fms.
1	108161	Fernandina, Florida, U. S. B. F. Station 2668	94 fms., 46.3° gy. s. dd. co.

DENTALIUM (COMPRESSIDENS) OPHIODON Dall.

Plate 14, fig. 2.

1881. *Dentalium ophiodon* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 38.
1889. *Dentalium ophiodon* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 427, pl. 26, fig. 9.
1889. *Dentalium ophiodon* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 9.
1897. *Dentalium ophiodon*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 126, pl. 7, fig. 13; pl. 22, figs. 61, 62.

(?)1901. *Dentalium filum*, Dall and Simpson, U. S. Fish Comm. Bulletin for 1900, vol. 1, p. 456.

1903. *Dentalium ophiodon* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 26, fig. 9.

The shell is small, evenly and considerably curved, slowly tapering, markedly compressed on the convex and concave sides, but not to the extent shown in *Dentalium pressum;* the lateral edges are not angulated even bluntly; the compression is greatest just back of the anterior aperture, which often appears to be somewhat constricted. It is thin but strong, of white color, glossy but not highly polished. A sculptural feature of "faint, irregular longitudinal striations" are given by the author, but I have never been able to detect these. Growth lines more clearly seen by aid of a lens, arch forward on the concave side. The entire surface is smooth but not polished. The apical orifice is simple, having neither notch nor slit. Measurements are:

Length, 15.5 mm.; greater diameter, 1.75 mm.; lesser diameter, 1.5 mm. (Pilsbry).

Length, 12.5 mm.; greater diameter, 1.33 mm. (Dall).

Length, 14.5 mm.; greater diameter, 1.25 mm.; lesser diameter, 1 mm., arc 1.5 (type).

The type, Cat. No. 95344, U. S. N. M., obtained by the *Blake* at United States Coast Survey Station 21, off Bahia Honda, Cuba, in 287 fathoms; no further data given.

This is an Antillean species of the continental slope zone. It is readily distinguished from *Dentalium pressum* by its smaller size and lesser degree of compression. A young specimen from Mayaguez, Porto Rico, Cat. No 161576, taken in 25 fathoms, is possibly *D. ophiodon.*

The following lots are in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	95345	Off Bahia Honda, Cuba, U. S. C. S. Station 21	287 fms.
1	314580	Off Fowey Light, Florida, *Eolis* Station 305	110 fms.
1	314581	Off Fowey Light, Florida, *Eolis* Station 364	75–90 fms.
2	314582	Off Fowey Light, Florida, *Eolis* Station 361	75–100 fms.
5	314583	Off Fowey Light, Florida, *Eolis* Station 373	70–90 fms.
1	314584	Off Fowey Light, Florida, *Eolis* Station 375	75–90 fms.
3	314585	Caesar's Creek, Florida, *Eolis* Station 376	90 fms.
1	314586	Off Ragged Key, Florida, *Eolis* Station 366	75–90 fms.
1	314587	Off Western Dry Rocks, Florida, *Eolis* Station 319.	90 fms.
1	314588	Off Western Dry Rocks, Florida, *Eolis* Station 320.	80 fms.
1	314589	Off Key West, Florida, *Eolis* Station 333	110 fms.
1	314590	Off Key West, Florida, *Eolis* Station 146	98 fms.
1	323812	Off Cape San Blas, Florida, U. S. B. F. Station 2400.	169 fms., gy. m.
[1] 1	95344	Off Bahia Honda, Cuba, U. S. C. S. Station 20	220 fms.
4	95346	Off Barbados, *Hassler*	110 fms.
4	314832	Barbados, S. U. I. Station	(deep).
4	314833	Barbados, off Pelican Island, S. U. I. Station 62	125 fms.
1	314834	Off Fernandina, Florida, U. S. B. F. Station 2668.	294 fms., gy. s. dd. co., 46.3°.
1	314835	Off Lazaretto, Barbados, S. U. I. Exped. Station 38.	130–140 fms., sd.

[1] Type.

Subgenus FUSTIARIA Stoliczka, 1868.

1868. *Fustiaria* STOLICZKA, Mem. Geol. Survey of India, Cretaceous Fauna of Southern India, vol. 2, p. 439.

Shell either polished smooth and sculptureless or with encircling grooves, having a round section. The apical orifice is round or ovate and has a very long, straight linear cleft on the convex side.

The subgenus includes but few recent forms, and but one species in the faunal areas here considered. The important feature of the subgenus is the very long apical cleft. It represents the extreme of the apical characters referred to as an "apical slit."

DENTALIUM (FUSTIARIA) STENOSCHIZUM Pilsbry and Sharp.

Plate 15, figs. 8, 9.

1860. *Dentalium translucidum* SOWERBY, Thes. Conch., vol. 3, p. 98, pl. 225, fig. 47 (not of Deshayes, 1821).
1872. *Dentalium translucidem* SOWERBY, Reeve's Conch. Icon., vol. 13, pl. 6, fig. 39.
1897. *Dentalium* (*Fustiaria*) *stenoschizum* PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 129, pl. 19, figs. 10–15.
1901. *Dentalium* (*Fustiaria*) *stenoschizum*, DALL and SIMPSON, Bull. U. S. Fish Comm. for 1900, vol. 1, p. 457.

The shell is rather strongly curved, having the maximum curvature in the posterior portion; it is regularly and rapidly increasing in diameter. The section is round; the shell is thin throughout, and almost fragile at the oral aperture. It is white, with a polished, smooth shining surface, transparent at the aperture and translucent elsewhere, and is wholly sculptureless. It possesses an extremely long and narrow apical slit, which in some specimens is quite one-fourth the entire length of the shell. This long cleft is on the convex side. Measurements are:

Length, 35 mm.; diameter, 3.4 mm. (Pilsbry).

Length, 26 mm.; diameter, 2.75 mm.; arc, 1.75 (Porto Rico).

This is the only species of this group so far recorded from the western Atlantic.

The museum lots are: One specimen, Cat. No. 161577, U.S.N.M., from Mayaguez Harbor, Porto Rico, U. S. B. F.; one specimen, Cat. No. 314837, U.S.N.M., collected by the State University of Iowa Expedition at their station 88, off the Lazaretto, Barbados, in about 100 fathoms; two specimens, Cat. No. 314838, U.S.N.M., collected by the State University of Iowa Expedition at their station 10, in 100 fathoms, off Pelican Island, Barbados; one specimen, Cat. No. 314907, U.S.N.M., dredged at Eolis Station 317, off the Western Dry Rocks, Florida, in 110 fathoms.

Family SIPHONODENTALIIDAE.

(For diagnosis see p. 10.)

Genus ENTALINA Monterosato, 1872.

1872. *Entalina* Monterosato, Notizie intorno alle Conchiglie Fossile di Monte Pellegrino e Ficarazzi, p. 27.

The shell, as in *Dentalium*, is largest at the aperture, tapering regularly to the apex; it is strongly ribbed with the apex either of angular or of round section. The foot of the animal expands into a disk, with digitate periphery, and has a median process or filament.

There are but two species of this genus thus far known from the western Atlantic.

KEY TO THE SPECIES OF THE GENUS ENTALINA.

Shell four sided	*quadrata*, page 88.
Shell five sided	*platamodes*, page 87.

ENTALINA PLATAMODES Watson.

Plate 15, figs. 1, 4, 5, 7.

1879. *Siphodentalium platamodes* Watson, Journ. Linn. Soc. London, vol. 14, p. 519.
1885. *Siphodéntalium platamodes* Watson, *Challenger* report (Scaphopoda), p. 13, pl. 2, fig. 4..
1889. *Dentalium platamodes*, Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1897. *Entalina platamodes*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 133, pl. 23, figs. 3–5.
1903. *Dentalium platamodes*, Dall, Bull. 37, U. S. Nat. Mus., p. 76.

The shell is small, finely tapered, strongly curved, especially near apex, five sided, but with four more prominent angles, forming roughly a square; the concave side is divided into two spaces by the fifth more obtuse angle. The extreme end of the apex is round, thin but solid. The color of the National Museum specimens is white, translucent, but the surface is not highly polished. A riblet following closely along each of the four prominent angles seemingly doubles these corner angles. A few longitudinal striae appear close to the angles, but none occupy the central portions of the flat spaces between, leaving them perfectly smooth, save for some microscopic growth lines. The concave space bisected by a primary obtuse angle referred to as less prominent than the other four tends to carry more of the longitudinal striae than do the other interangle spaces. No apical notch is present. Measurements are:

Length, 0.47 inch; diameter, 0.049 inch (type) (11.94 mm. by 1.27 mm.).

Length, 10.5 mm.; diameter, 1.25 mm.; arc, 1.75 (Rebecca Shoals).

There seems to be no question as to the identity of the National Museum specimens with Watson's species as described from off Culebra Island, West Indies, in 390 fathoms.

In the museum collection are two lots: One specimen, Cat. No. 94294, U.S.N.M., collected by Commander Rush, United States Navy, off Rebecca Shoals, Florida, in 430 fathoms, bottom of coral mud; three specimens, Cat. No. 108163, U.S.N.M., dredged by the *Albatross* at U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of sand and temperature 46.3° F.

ENTALINA QUADRATA, new species.

Plate 15, figs. 2, 3, 6, 10.

The shell is small, thin but solid, strongly curved, especially near the apex. The tip is quadrate, the entire shell preserving a quadrate section throughout; the flat surface of the convex side is the smallest, that of the concave side the largest, and the two lateral spaces are about equal. The color is hyaline white; translucent; the surface is not brightly polished. In the tip portion the four flat spaces between the angles are smooth but soon take on six to eight thread-like longitudinal secondary riblets persisting to the end, the primaries remaining always as definite corners or angles rather than ribs. No apical features are present.

The type, Cat. No. 95354, U.S.N.M., measures—length, 12 mm.; diameter, 1.1 mm.; arc, 1.75; and was dredged by the *Blake* at the United States Coast Survey Station 248 off Grenada, in 159 fathoms, bottom of fine gray ooze, temperature 53.5° F.

The difference between this and *Entalina platamodes* seems well defined in the few specimens at my command, but it is quite possible that a series of many specimens would unite the two.

Both this and *E. platamodes* are evidently species of the Antillean island slope zone and probably occupy as well a still deeper range.

Genus SIPHONODENTALIUM Sars, 1859.

1859. *Siphonodentalium* Sars, Forh. Videnskabs-Selskabet i Christiania, Aar 1858, p. 52.

The shell is arcuate, slightly tapering, the largest diameter being at the aperture; circular, or nearly so, in section; smooth, with a rather large apex, which may be either simple or slit into lobes. The foot of the animal is capable of expanding into a terminal disk.

The subgenera indicated are:

Siphonodentalium, characterized by the apex being slit into lobes or teeth; and

Pulsellum, which has a simple apex, unmodified by lobes or teeth.

The genus includes a few species of cold water distribution, which, for the most part, live upon the lower continental shelf or the ocean floor.

KEY TO THE SPECIES OF THE SUBGENUS SIPHONODENTALIUM.

Shell smooth.
  Apex 6 lobed.......................................*lobatum*, page 89.
  Apex 2 lobed.
    Less slender shell (5.5 mm. by 1.23 mm.)..................*tytthum*, page 91.
    More slender shell (7 mm. by 0.8 mm.)....................*verrilli*, page 91.
Shell not smooth......................................*striatinum*, page 90.

SIPHONODENTALIUM (SIPHONODENTALIUM) LOBATUM Sowerby.

Plate 16, figs. 1, 9.

1851. *Dentalium vitreum* SARS, Ny. Mag. f. Naturviden., vol. 8, p. 178 (not of Gmelin, 1788).
1860. *Dentalium lobatum* SOWERBY, Thes. Conch., vol. 3, p. 100, pl. 3, fig. 44.
1860. *Dentalium lobatum* SOWERBY, Reeve, Conch. Icon., vol. 18, pl. 5, fig. 36.
1880. *Siphonodentalium vitreum*, VERRILL, Proc. U. S. Nat. Mus., vol. 3, p. 394.
1882. *Siphonodentalium vitreum*, VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 5, pt. 2, p. 557.
1896. *Dentalium lobatum*, CLESSIN, Conchylien Cab., vol. 6, pt. 5, p. 15, pl. 4, fig. 6.
1897. *Siphonodentalium lobatum*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 136, pl. 23, figs. 8 to 21.
1901. *Siphonodentalium lobatum*, WHITEAVES, Cat. Mar. Invert. Canada, p. 153.
1915. *Siphonodentalium lobatum*, JOHNSON, Occ. Papers Boston Soc. Nat. Hist., vol. 7, No. 13, p. 83.

An extensive European bibliography is omitted.

The shell is short, thin but solid, and so rapidly increasing in diameter as to give to it a "stumpy" appearance. It is regularly, deeply curved, with a rather large apex. The anterior aperture is oblique and shell section round. The color is of a milky white, the shell being of vitreous texture, translucent, and sometimes quite transparent. The surface is smooth and sometimes highly polished. It is without sculpture. The apical characters consist of six lobes, a subtriangular one on each side, with two on the convex, and two short ones on the concave side. These apical features, however, are rarely well preserved on account of the fragile nature of the lobes.

Measurements are:

Length, 16 mm.; diameter, 2.7 mm.; arc, 1.8 (Finmark).
Length, 17 mm.; diameter, 2.5 mm.; arc, 2. Gulf of St. Lawrence.
Length, 19 mm.; diameter, 3 mm.; arc, 2. Lofoten.

This is a deep cold water species of the northern Atlantic and Arctic Oceans.

A critical comparison of American specimens with lots in the Jeffreys collection leaves no room for doubt as to their specific identity. Three lots from off Marthas Vineyard in 100 to 384 fathoms, and from off Cape Hatteras in 516 fathoms, are smaller than the dimension above given. As they are but fragments I have not separated them from the general series. It is probably a very widely distributed species on the ocean floor.

The following are west Atlantic records in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	83425	Gulf of St. Lawrence (Whiteaves)	
1	75458	Gulf of Maine, U. S. B. F. Station 12 B	60 fms., br. m., 42°.
1	38174	Off Marthas Vineyard, U. S. B. F. Station 949	100 fms., yl. m., 52°.
1	202964	Off Marthas Vineyard, U. S. B. F. Station 2213	384 fms., gr. m., 39.5°.
1	35762	Off Cape Hatteras, U. S. B. F. Station 2110	516 fms., br. m., 40°.
1	314907	Off New Jersey, U. S. B. F. Station 2210	1525 fms., gy. oz., 36.9°.
1	314908	Off Nantucket, U. S. B. F. Station 2570	1813 fms., glob. oz., 36.8°.

SIPHONODENTALIUM (SIPHONODENTALIUM?) STRIATINUM, new species.

Plate 16, fig. 3, 8.

A lot of 10 specimens, none of which are in good condition, from off Fernandina in 294 fathoms, are not referable to any known Scaphopod species. Although none of these preserve the apical features in sufficient definiteness to establish their positive reference to *Siphonodentalium,* yet the general facies of the shells seem clearly to place them within that group. An objection lies in the fact that these shells are not wholly sculptureless, but even this fact might not constitute a bar, as so few species of this genus are known. Doctor Watson included the sculptured *Siphonodentalium eboracense* under this genus, and his dictum was approved by Pilsbry and Sharp in their monograph.[1] It seems best for the present to include this species here, and should new and better material come to hand and make more positive this classification, the original description of Sars's genus can be amended to include sculptured forms. I feel quite sure this will ultimately be necessary.

The shell is moderately to strongly and irregularly curved, short, of rather quickly increasing diameter, and with a relatively large apical opening. The cylinder has not the regularity of increase usual in *Dentalium,* but in certain sections of the shell it appears to be slightly swollen. It is thin but not fragile, translucent and white in color, the surface having an oily rather than a polished appearance. About 60 very minute longitudinal striae, beginning at the apex and continuing with lesser distinctness to the senile portion of the shell, are a peculiar feature. These striae can hardly be seen without the aid of a strong lens. Any apical features, if present, are not revealed by National Museum specimens. The ragged edges of the apices may indicate a series of lobes or slits.

The type, Cat. No. 108166, U.S.N.M., measures—length, 7 mm.; diameter, 1 mm. It was dredged by the *Albatross* at U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of gray sand and dead coral, temperature 46.3° F. It is from a lot of 10 specimens.

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[1] Manual of Conchology, vol. 17, p. 140.

SIPHONODENTALIUM (SIPHONODENTALIUM) TYTTHUM Watson.

Plate 16, fig. 5.

1879. *Siphonodentalium tytthum* Watson, Journ. Linn. Soc. London, vol. 14, p. 520.
1885. *Siphonodentalium tytthum* Watson, *Challenger* Rept. (*Scaphopoda*) p. 14, pl. 2, fig. 5.
1897. *Siphonodentalium tytthum*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 137, pl. 23, fig. 2.

The shell is thin, very short, very rapidly broadening, and strongly curved. The color is white, glossy, but not brilliant; translucent, but opaque when dead. It is sculptureless save for faint growth lines. The apex has two lateral clefts.

The type measures—length, 5.5 mm.; diameter, 1.23 mm. It was taken north of Culebra Island in 390 fathoms by the *Challenger* at Station No. 24.

There are no examples in the museum collection, nor have I seen specimens of this species.

SIPHONODENTALIUM (SIPHONODENTALIUM), species?

A single imperfect specimen in the National Museum collection of a large species of *Siphonodentalium*, suggesting but not referable to *S. lobatum*, I leave unnamed in the hope that better material may some time be received that will furnish a positive diagnosis. It is Cat. No. 161574, U.S.N.M., from Mayaguez Harbor, Porto Rico, in 25 fathoms, taken at the U. S. B. F. Station 6062.

SIPHONODENTALIUM (SIPHONODENTALIUM) VERRILLI, new species.

Plate 16, figs. 2, 7.

A few lots of *Scaphopods* in the museum collection labeled by Professor Verrill "*S. teres* Jeffreys var.," upon careful comparison with Jeffreys's specimens of that species from the eastern Atlantic, collected by the *Porcupine*, prove to be distinct. The following is a diagnosis of the American species:

The shell is very small, thin, slender, slightly but evenly curved and somewhat laterally compressed, giving to it an oval section; the aperture is oblique. The apical diameter is very small. The color is white, translucent, becoming milky opaque in the anterior portion; the surface has an oily appearance and is not polished. It is entirely sculptureless. The apical characters consist of two projecting lateral lobes, separated by deep cuts or slits on the concave and convex sides.

The type, Cat. No. 314844, U.S.N.M., measures—length, 7 mm.; diameter, 8 mm.; arc, 2. It was dredged by the *Albatross* at the

U. S. Bureau of Fisheries Station 2710, off Nantucket, in 984 fathoms, bottom of green mud.

In the Transactions of the Connecticut Academy of Sciences (vol. 6, pt. 1, p. 218) Professor Verrill refers to *Siphonodentalium teres* Jeffreys, three lots taken by the *Albatross* at U. S. Bureau of Fisheries Station 2072 in 858 fathoms, at Station 2084 in 1,290 fathoms, and at Station 2115 in 843 fathoms. All these stations are off Nantucket. I have not seen these specimens.

The apical features of this, as well as of most of these small *Siphonodentalia*, are often obliterated by the destruction of the very fragile lobes, leaving only a ragged apical orifice, which shows only traces of one or both fissures, or perhaps leaves but a simple round opening where both lobes are evenly broken off. I have selected a specimen for the type other than that used by Professor Verrill to illustrate his "var. of *teres*," as it is a perfect specimen received since he identified the Bureau of Fisheries material.

The following table gives the lots in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	314844	Off Nantucket, U. S. B. F. Station 2710	984 fms., gr. m.
1	76833	Delaware Bay, U. S. B. F. Station 2739	811 fms., gy. m.
1	202963	Martha's Vineyard, U. S. B. F. Station 2213	384 fms., gr. m.
1	203010	Off New Jersey, U.S. B. F. Station 2710	984 fms., gr. m.
1	52304	Off Georges Bank, U. S. B. F. Station 2531	852 fms., gy. m.
3	78242	Off Nantucket, U. S. B. F. Station 2682	1004 fms., gr. m. s.
1	38076	Off Georges Bank, U. S. B. F. Station 2084	1290 fms., bu. m. s.
4	38697	Off Block Island, U. S. B. F. Station 2203	705 fms., gr. m. s.
4	78244	Off Nantucket, U. S. B. F. Station 2710	984 fms., gr. m.
1	35625	Off Hatteras, U. S. B. F. Station 2115	843 fms., m. pue. s.
1	52304	Off Georges Bank, U. S. B. F. Station 2531	852 fms., gy. m.
5	78244	Off Nantucket, U. S. B. F. Station 2710	984 fms., gr. m.

[1] Type.

The rather fragmentary character of the specimens at my disposal and the likelihood of obliteration of their apical features, if they ever possessed any, leave me doubtful as to the true subgeneric position of the two following species here placed under *Pulsellum*. It is also possible that *Siphonodentalium occidentale* and *S. verrilli* will prove to be identical when better material is at hand for critical study. *S. bushi* is clearly separable from the two just mentioned, but it may be entitled to no more than subspecific rank under any one of several northeastern Atlantic species referred to by Professor Verrill as, in his belief, conspecific with species from our side of the ocean.

Subgenus PULSELLUM Stoliczka, 1868.

1868. *Pulsellum* Stoliczka, Cret. Fauna of S. India, vol. 2, p. 441.

This subgenus includes the *Siphonodentalia* that have a simple apical orifice—that is, unmodified by lobes or slits.

Type.—*Siphonodentalium lofotense* Sars.

On account of the fragility of these apical features in small delicate shells it is often difficult to assign any species positively to this group.

KEY TO THE SPECIES OF THE SUBGENUS PULSELLUM.

Shell rather strongly curved, length 5 mm ....*bushi*, page 94.
Shell slightly curved, length 3.15 mm ....*occidentale*, page 93.

SIPHONODENTALIUM (PULSELLUM) OCCIDENTALE, new species.

Plate 16, fig. 4.

1880. *Siphoentalis lofotensis*, Verrill, Amer. Journ. Sci., vol. 20, p. 392 (not of Sars, 1864).
1880. *Siphoentalis lofotensis*, Verrill, Proc. U. S. Nat. Mus., vol. 3, p. 395 (not of Sars).
1882. *Siphoentalis lofotensis*, Verrill, Trans. Conn. Acad. of Arts and Sci., vol. 5, pt. 2, p. 558 (not of Sars).
1884. *Siphoentalis lofotensis*, Bush, Report of Com. of Fish and Fisheries for 1883, vol. 17, p. 717 (not of Sars).
1897. *Siphonodentalium* (*Pulsellum*) *lofotense*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 138, in part and omitting all figures.
1915. *Siphonodentalium* (*Pulsellum*) *lofotense*, Johnson, Occ. Papers Boston Soc. Nat. Hist., vol. 7, No. 13, p. 84 (not of Sars).

The shell is very small, thin, fragile, slightly curved, moderately tapering, with a relatively large apex, round section, and oblique aperture. In color it is a translucent white, with milky white bands or growth rings, and some opaque patches. It has no sculpture nor apical notch nor lobes.

The type, Cat. No. 38702, U.S.N.M., measures—length, 3.15 mm.; diameter, 0.5 mm. It was taken at the U. S. Bureau of Fisheries Station 871 off Marthas Vineyard in 86 fathoms.

Critical comparison of many of our western Atlantic species with actual types or authors' specimens of European species (hitherto considered conspecific with them), has led me to separate them at least subspecifically. I feel, therefore, that it requires substantial evidence to establish the specific, or especially a subspecific, identity of mollusks from the two sides of the Atlantic. These tiny, fragile little shells, almost featureless and usually broken and fragmentary, can not furnish this evidence. Were a larger proportion of the species of the two faunas really identical I would then consider the burden of proof to be upon the one who would separate rather than upon him who seeks to unite them. The museum records given below indicate this to be a species of the lower continental slope and of northern range:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
11	38702	Marthas Vineyard, Station 871	86 fms., lot includes type.
1	78244	New Jersey, Station 2710	984 fms., gn. m.
2	314911	Latitude 35:12:10, Station 2110	516 fms., bu. m.
2	314910	Latitude 39:09, Station 2234	810 fms., gn. m.
1	314912	Latitude 41:06, Station 2262	250 fms., gn. m. s.

SIPHONODENTALIUM (PULSELLUM) BUSHI, new species.

Plate 16, fig. 6.

1880. *Siphoentalis affinis*, Verrill, Proc. U. S. Nat. Mus., vol. 3, p. 395. (not of Sars).

1882. *Siphoentalis affinis*, Verrill, Trans. Conn. Acad. Arts and Sci., vol. 5, pt. 2, p. 558, pl. 42 fig. 20 (*a*) (*b*) (not of Sars).

1884. *Siphoentalis affinis*, Verrill, Report Com. of Fish and Fisheries for 1883, p. 573, in part.

1884. *Siphoentalis affinis*, Bush Report Com. of Fish and Fisheries for 1883, p. 717, in part.

1897. *Siphonodentalium* (*Pulsellum*) *affine*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 140.

The shell is fairly strongly curved, regularly tapering, thin, fragile, with a large posterior aperture and round section. It is translucent, white, smooth but not shining. No sculpture is present, nor are there any apical features to be observed in museum specimens. Professor Verrill indicated "one slight notch."

The type, Cat. No. 76723, U.S.N.M., measures—length, 5mm.; diameter, 0.75 mm.; arc, 0.15. It was dredged by the *Albatross* at U. S. Bureau of Fisheries Station 2710 in 984 fathoms, bottom of green mud.

This differs from *Siphonodentalium teres* in its greater degree of curvature and the rate of increase in diameter. It is larger than *S. lofotense*, stouter than *S. affine*, and is very much larger and more curved than is *S. occidentale*.

As to the generally accepted identity of this with *S. affine* Sars, see remarks under last species (*S. occidentale*).

There are 12 lots in the museum collection, all dredged at Bureau of Fisheries stations off Marthas Vineyard, Georges Bank, Delaware, and Hatteras, in from 319 to 1,290 fathoms. It is a northern cold water species, of a depth zone ranging from the lower continental slope to the ocean floor.

The following are the museum lots:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
2	38071	Off Georges Bank, U. S. F. C. Station 2078	499 fms., 40°, gy. m. s.
3	61145	do.	Do.
2	38090	Off Marthas Vineyard, U. S. F. C. Station 894	365 fms., 40°, sft. br. m.
1	52307	Off Marthas Vineyard, U. S. F. C. Station 2574	390 fms., 40°, gr. m.
1	52313	Off Marthas Vineyard, U. S, F. C. Station 2584	541 fms., 40°, gy. m.
2	38700	Off Marthas Vineyard, U. S. F. C. Station 2213	384 fms., 39.5°, gr. m.
1	76722	Off Marthas Vineyard, U. S. F. C. Station 947	319 fms., 44°, s. m.
2	38699	Off Nantucket Shoals, U. S. F. C. Station 2203	705 fms., 38.9°, gr. m. s.
1	78395	Off Block Island, U. S. F. C. Station 2689	525 fms., gr. m.
1	76662	Off Delaware, U. S. F. C. Station 2233	630 fms., 29.2°, gr. m.
5	76723	Off New Jersey, U. S. F. C. Station 2710	984 fms., gr. m. (type lot).
2	35718	Off Cape Hatteras, U. S. F. C. Station 2110	516 fms., 40°, br. m.

Genus CADULUS Philippi, 1844.

1844. *Cadulus* PHILIPPI, Enum. Moll. Sicil., vol. 2, p. 209.

Small, white, sculptureless *Scaphopods*, which are more or less arcuate, generally swollen, or with an inflated bulging area in the middle portion of the shell or near the anterior aperture; the aperture is more or less contracted and usually very oblique. The apical aperture is proportionately quite large as compared with that of *Dentalium;* it is either simple or cut by two or four slits. Section round or flattened. Occasionally an internal circular rib is developed just within the apical orifice.

The genus is somewhat artificially divided into four subgenera as follows:

1. Apex with 2 deep slits...*Dischides*.
2. Apex with 4 deep slits...*Polyschides*, page 96.
3. Apex with 2 or 4 very shallow, broad slits..........................*Platyschides*, page 104.
4. Apex simple (unslit).
    (*a*) Obese, dorsal, and ventral arcs both convex.............*Cadulus*, page 141.
    (*b*) Slender, one arc convex, the other more or less concave...*Gadila*, page 130.

Species showing extreme characters are clearly and easily referred to a subgenus, but there are species that could be placed in more than one. The apical features, when normally present, are not infrequently broken or worn away in poor or senile specimens.

The genus is represented in east American Atlantic waters in all its faunal areas and in all depths from near the tidal zone to the abyssal depths. The mollusk lives in sandy and muddy stations and often in great individual quantity.

As a rule the species are not very widely distributed, but certain exceptions are notable. *Cadulus platensis*, for instance, is found off the Argentine coast to Georgia, and is further extended through slight shell differences into the eastern Atlantic, north to Great Britain, where, with relatively slight modification, it is *C. tumidosus* Jeffreys. This is judging only from the shell characters.

The amount of variation in any one species is usually slight, except in the bulbous species under the subgenus *Cadulus*. Among some of these the degree of swelling may differ somewhat in individuals, but even here the seemingly great variation is exaggerated to the eye by breakage of the ends of the shells causing the shortened specimens to appear more inflated. At present almost nothing is known of the ecology of the genus.

In the descriptions following, color, sculpture, and all features relating to the shell texture will be omitted, as these remain essentially the same; i. e., color white; sculpture none; texture vitreous and more or less translucent or transparent. In some cases the clear vitreous shell is modified by circular deposits of shelly material, causing alternate rings of more or less translucency. These are not, however, specific characters, but appear to be wholly individual and possibly pathologic. Sculpture is sometimes mentioned by authors, but almost apologetically. In a few cases, notably in *Cadulus acus*, the alternate rings of more and less dense shelly deposit present a surface that might possibly be referred to as sculptured, but it is not a true sculpture in the sense employed in descriptions of *Dentalium*.

The words ''dorsal'' and ''ventral'' are employed in descriptions of *Cadulus* to mean the convex and the concave sides or arc of the shell, dorsal being the convex side. There is, however, a difference of opinion as to which side is actually dorsal or truly ventral as in conformity with the ''back'' or ''front'' of the animal.

Measurements of the "arc," as the term is used in the descriptions of *Dentalium*, will be omitted, as the small size of the shell and irregular lines of curvature do not lend themselves well to this feature of diagnosis. The important specific characters of the *Caduli* are the slits and lobes about the edge of the apical orifice, referred to as "apical characters," the general shape of the shell as determined by the position of the equator (section of maximum diameter); the ratio of length to breadth; the localized or general type of swelling; the compression (either lateral or dorso-ventral) of the shell; the obliquity of the aperture; and, lastly, the size. Thus these little colorless shells possess more characters than at first seem possible. A good way to proceed in identifying material is to examine first the apical characters in order to place the shells in their proper subgeneric groups. Then seek among the figured species of about a similar size for those that have median or submedian equators or with equators more anteriorly placed. These are the important points of resemblance to be first established, after which the oval or round section, the small or large apical orifice, and the obliquity of the aperture, follow. Geographic and temperature ranges are especially important and should be kept always in mind when seeking to determine material. In a general way it may be said that the large and medium sized species fall under *Platyschides*, the small and slender forms under *Gadila*, the small bulbous species under *Cadulus*, while those of very prominent deep apical slits are *Polyschides*.

Subgenus POLYSCHIDES Pilsbry and Sharp, 1898.

1898. *Polyschides* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 148.

The shell is inflated above [anterior to], the middle or not much bulging; the apex is cut into a number of lobes, generally four, by as many slits.

Genotype.—Cadulus tetraschistus Watson. For enlarged drawing of apical characters of *Polyschides* see plate 17, figure 7.

The chief characters of the subgenus are the deep slits and prominent apical lobes. In all the species coming within our notice these apical lobes are four in number.

KEY TO THE SPECIES OF THE SUBGENUS POLYSCHIDES.

Apical notches deep.
  Shell fusiform, length 5 to 6 mm.......................................*tetrodon*, page 101.
  Shell not fusiform.
    Length, 7.45 mm......................................*tetraschistus*, page 97.
    Length, 8 to 11 mm....................*quadridentatus quadridentatus*, page 99.
  Shell slightly compressed; length, 5 to 6 mm..*quadridentatus acompsus*, page 100.
Apical notches less deep; length, 9 to 10 mm....................*carolinensis*, page 102.

CADULUS (POLYSCHIDES) TETRACHISTUS Watson.

Plate 17, fig. 1.

1879. *Siphodentalium tetraschistum* WATSON, Journ. Linn. Soc. London, vol. 14, p. 521.
1885. *Siphodentalium tetraschistum* WATSON, *Challenger* Report (Scaphopoda), p. 15, pl. 2, fig. 8.
1898. *Cadulus* (*Polyschides*) *tetraschistus*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 148, pl. 23, fig. 1.

The shell is cylindric, rather evenly curved, convex on the dorsal, and concave on the ventral side, tapering from about the middle to the apex, and slightly contracted about the aperture. There is no very decided localized inflation. There is a remote suggestion of evanescent longitudinal sculpture.

The apex is slit into four pointed lobes by four unequal, irregular, rough-edged, gaping clefts, leaving the lobes one dorsal, one ventral, and two lateral. Two narrow callus-like internal bands are present just within the apex. Measurements are: Length, 7.45 mm.; diameter, 0.9 mm.; anterior aperture, 0.75 mm.; spiral aperture, 0.5 mm.

The type, now in the British Museum, was taken by the *Challenger* near the island of Fernando Noronha in 25 fathoms. The species is only known to me by original description, and there are no examples in the National Museum collection.

CADULUS (POLYSCHIDES) QUADRIDENTATUS Dall.

1881. *Siphonodentalium quadridentatum* DALL, Bull. Mus. Comp. Zool., vol. 9, p. 36.
1885. *Cadulus incisus* BUSH, Trans. Conn. Acad. Arts and Sci., vol. 6, p. 471, pl. 45, fig. 20.
1889. *Cadulus quadridentatus* DALL, Bull. Mus. Comp. Zool., vol. 18, p. 428, pl. 27, fig. 5.
1889. *Cadulus quadridentatus* DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 5.
1889. *Cadulus quadridentatus*, var. *incisus*, DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 41, fig. 20.
1889. *Cadulus quadridentatus* DALL, Proc. U. S. Nat. Mus., vol. 12, p. 295.
1892. *Cadulus quadridentatus* DALL, Trans. Wagner Free Inst. Phila., vol. 3, p. 445.
1898. *Cadulus* (*Polyschides*) *tetraschistus quadridentatus*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 149, pl. 23, fig. 7; pl. 28, figs. 1–5.

1898. *Cadulus* (*Polyschides*) *tetraschistus incisus*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 150, pl. 25, fig. 65.

1903. *Cadulus quadridentatus* DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 5.

1903. *Cadulus incisus*, DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 41, fig. 20.

The shell is gradually and regularly increasing in diameter without any local bulge or swelling to a section just back of the aperture, thence it slightly contracts; moderately curved. A section of the shell is nearly a circle. The aperture is very oblique, oval, with its peristome rounded and smooth. The apex is cut by four deep slits, leaving four pointed lobes; the longest on the convex side is often a little bent in; the other three lobes are one on the ventral and two on the lateral sides; the lateral ones are of subequal length; the ventral lobe is wide and obtusely pointed. The edges of all these triangular lobes are flattened as though planed off.

Length, 10 mm.; greater diameter, 1.03 mm.; anterior aperture, 0.8 mm.; apical aperture, 0.4 mm. (type).

Length, 8 mm.; greater diameter, 1.1 mm.; anterior aperture, 1 mm.; apical aperture, 0.5 mm. (type of *C. incisus*).

Length, 7 mm.; greater diameter, 1 mm.; anterior aperture, 0.8 mm.; apical aperture, 0.5 mm. (*C. incisus*).

Length, 8 mm.; maximum diameter, 1.10 mm.; anterior aperture, 1 mm.; apical aperture, 0.6 mm. (average).

Length, 5.1 mm.; maximum diameter, 0.75 mm.; anterior aperture, .6 mm.; apex, .4 mm. (*C. q. acompsus*).

The type of *Cadulus quadridentatus* is in the Museum of Comparative Zoology (Cat. No. 7739) and is from the west coast of Florida, in 30 fathoms, collected by Pourtales.

The type of *C. incisus*, Cat. No. 44860, U.S.N.M., was dredged at the U. S. Bureau of Fisheries Station 2272, off Cape Hatteras, in 15 fathoms, bottom of gray sand.

The differences to be noted in Miss Bush's description of *C. incisus* from that of Doctor Dall's *C. quadridentatus* are at once harmonized by the comparison of many specimens. It is a very abundant shallow-water form from Cape Hatteras to the Gulf of Mexico, the Bahamas, Cuba, Yucatan, and probably throughout the entire Caribbean region. It is also recorded from Bermuda. Two poor specimens from off Rio de la Plata in 10 fathoms (*Albatross* Station 2765) seem to be referable to this species. The deepest record in the Museum collection is 52 fathoms off Cape Lookout, the least, 3 fathoms off Miami, Florida, and off Cat Cay, Bimini Islands.

Pilsbry and Sharp united this species with Watson's *C. tetraschistus* as Doctor Dall had already suggested in his original description. The ruling is probably correct, but lacking opportunity actually to compare specimens I hesitate to unite shallow-water forms separated by so wide an expanse of deep sea. It is, however, a species of exceptionally extended range. In many old or worn specimens the apical features become less prominent, and consequently the slits are less deep. Even in such event the shells, by reason of other characters, need never be confused with other species of normally lesser apical lobes and which occupy in part the same faunal areas.

A small race of 5.5 to 6 mm. in length, but differing in no other respect, is found in Barbados (12 fathoms). It scarcely deserves a subspecific name.

I have divided the species into two subspecies.

CADULUS (POLYSCHIDES) QUADRIDENTATUS QUADRIDENTATUS Dall.

Plate 17, figs. 2, 3.

This, the typical subspecies, includes all forms under the description of *Cadulus quadridentatus* Dall, excluding only a smaller race that exhibits a slight lateral compression in the anterior portion of the shell.

The type is of *C. quadridentatus.*

The following are the lots in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	44860	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2272.	15 fms. gy. s. blk. sp. (type of *incisus Bush*).
1	190649	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2275.	16 fathoms, gy. s. and brk. sh.
5	181243	Off Cape Hatteras, North Carolina, U. S. B. F.	17.5 fms.
22	92832	Off Cape Hatteras, North Carolina, U. S. B. F. Station 1597.	22 fms., 73.5°, wh. s., brk. sh.
3	329740	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2598.	Do.
14	93138	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2597.	15fms., crs. gy. s.
4	330174	Off Cape Lookout, North Carolina, U. S. B. F. Station 2612.	52 fms., crs. wh. s., brk. sh., 67°.
6	93142	Off Cape Lookout, North Carolina, U. S. B. F. Station 2612.	Do
1	93141	Off Cape Lookout, North Carolina, U. S. B. F. Station 2610.	22 fms., 78.8° wh. s., brk. sh.
8	93139	Off Cape Lookout, North Carolina, U. S. B. F. Station 2607.	18 fms., 73.5° fne. gy. s.
3	93140	Off Cape Lookout, North Carolina, U. S. B. F. Station 2608.	22 fms., 78.2° crs. gy. s.
13	92820	Off Cape Lookout, North Carolina, U. S. B. F. Station 2611.	31 fms., 74° blk. s., brk. sh.
37	92826	Off Cape Fear, North Carolina, U. S. B. F. Station 2617.	14 fms., crs. yl. s., brk. sh.
75+	93145	Off Cape Fear, North Carolina, U. S. B. F. Station 2619.	15 fms., crs. yl. s.
9	93143	Off Cape Fear, North Carolina, U. S. B. F. Station 2616.	17 fms., s.
10	92827	Off Cape Fear, North Carolina, U. S. B. F. Station 2622.	15 fms., 74° gy. s., brk. co.
2	82994	Frying Pan Shoals, North Carolina	12 fms. (Rush).
2	314591	Miami, Florida, *Eolis* Station 83	3 fms.
1	314592	Miami, Florida, *Eolis* Station 157	22 fms.
14	314593	Miami, Florida, *Eolis* Station 62	20 fms.
2	314594	Miami, Florida, *Eolis* Station 93	18–25 fms.
4	314595	Miami, Florida, *Eolis* Station 117	35–38 fms.
1	314596	Miami, Florida, *Eolis* Station 111	15 fms.
7	314597	Miami, Florida, *Eolis* Station 49	30 fms., s., brk. co.
2	314598	Miami, Florida, *Eolis* Station 70	10 fms.
4	314599	Miami, Florida, *Eolis* Station 51	24 fms.
4	314600	Miami, Florida, *Eolis* Station 103	20 fms.
8	314601	Miami, Florida, *Eolis* Station 118	30 fms.
8	314602	Miami, Florida, *Eolis* Station 113	18–20 fms.
15	314603	Fowey, Florida, *Eolis* Station 8	25 fms.
9	314604	Fowey, Florida, *Eolis* Station 90	44 fms.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314605	Fowey, Florida, *Eolis* Station 107	40–50 fms.
5	314606	Fowey, Florida, *Eolis* Station 105	40 fms.
1	314607	Fowey, Florida, *Eolis* Station 119	23 fms.
1	314608	Fowey, Florida, *Eolis* Station 121	30 fms.
1	314609	Fowey, Florida, *Eolis* Station 131	25 fms.
4	314610	Off Turtle Harbor, Florida, *Eolis* Station 59	20 fms.
2	314611	Off Long Reef, Florida, *Eolis* Station 135	38 fms.
1	314612	Off Conch Reef, Florida, *Eolis* Station 7	35 fms.
1	323017	Off Key West, Florida, U. S. B. F. Station 2315.	37 fms., co.
3	314613	Tortugas, Florida, *Eolis* Station 33	16 fms.
8	323516	Off Cape San Blas, Florida, U. S. B. F. Station 2371.	26 fms., gy. s., sh., 65.8°.
1	323473	Off Cape San Blas, Florida, U. S. B. F. Station 2370.	25 fms., crs. gy. s., sh.
8	194636	Off Anclote Light, Florida, U. S. B. F. Station 7106.	12.5 fms., r., crs. s., 63°.
6	194903	West coast, Florida	10–12 fms. (Benedict).
4	181209	Point Pinallis, Florida	(Stearns.)
2	323117	Off Cape Catoche, Yucatan, U. S. B. F. Station 2361.	25 fms., crs. s.
1	314614	Cayo Levisa, Northwest Cuba, *Barrera* Station 201.	
8	314615	Cabanas Harbor, Cuba, *Barrera* Station 202	25 fms.
2	314616	South of Cat Cay, Bahamas, *Eolis* station 47	3 fms.
1	314617	South Bimini Island, Bahamas, *Eolis* Station 72.	Shore drift.
10	314618	North Bimini Island, Bahamas, *Eolis* Station 50.	20 fms.
2	96537	Off Rio La Plata, U. S. B. F. Station 2765	10 fms., s. and sh.
2	314913	Antigua, English Harbor, S. U. I. Exped	2 fms.
1	314914	Falmouth, Antigua, S. U. I. Exped	
3	314915	Carlisle Bay, Barbados, S. U. I. Exped	6 fms.
4	314916	Barbados, S. U. I. Exped	Shallow.
3	314917	Carlisle Bay, Barbados, S. U. I. Exped	12 fms., small race.
8	314918	Barbados, S. U. I. Exped	Shallow, small race.

CADULUS (POLYSCHIDES) QUADRIDENTATUS ACOMPSUS, new subspecies.

Plate 17, fig. 4.

Several lots of shallow water Caduli from Puerto Barios, Livingston, and Monkey River, Honduras, and from Belize Harbor, collected by Schumo and now in the collection of the Philadelphia Academy of Natural Sciences, are much smaller than are the shells of the typical subspecies and possess besides a slight degree of lateral compression in the extreme anterior portion of the shell. Most of the specimens in these lots are banded by irregular rings of internal callous, but this is not likely a diagnostic character.

The type measures—length, 5.1 mm.; diameter, 75 mm.; anterior aperture, 0.6 mm.; apical aperture, 0.4 mm. It is in the collection of the Philadelphia Academy of Natural Sciences, Cat. No. 76557, from Monkey River, British Honduras.

The apical features are quite normal, though broken in most of the examples before me. Some specimens are a trifle larger than the type. This must not be confused with a small race of *Cadulus quadridentatus quadridentatus*, already mentioned, from Barbados.

It is a shallow-water form of the muddy bogs and probably ranges along the entire Central American Altantic coast, but has not so far been noted from the Antilles or the Florida region. In the museum collection is one lot of five specimens, Cat. No. 314939, U.S.N.M., collected by Schumo at Monkey River, British Honduras, and presented by the Philadelphia Academy of Natural Sciences. These are from the type lot.

CADULUS (POLYSCHIDES) TETRODON Pilsbry and Sharp.

Plate 17, fig. 5.

1889. *Cadulus amiantus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 43, in part and omitting figures.

1897. *Cadulus (Polyschides) tetrodon* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 151, pl. 29, figs. 14–18.

The shell is small, slender and slightly curved; the convex side is rather evenly arched; the concave side is straighter, with a slight convexity at a point about one-third the total distance from the aperture—the section of maximum caliber. This amounts to but a slight swelling, from which the shell tapers gradually to the two ends. The aperture is oblique, round and its peristome blunt and rounded. The apex is cut by four slits, leaving four triangular lobes, the one on the convex side being slightly longer and rounded, the lobe opposite it broader and flat-topped, while the two lateral lobes are smaller. The edges of all these lobes are planed off or "beveled to an edge." Measurements are:

Length, 5.6 mm.; maximum diameter, 1 mm.; aperture, 0.6 mm.; apex, 0.35 to 0.43 mm.

Length, 5 mm.; maximum diameter, 0.88 mm.; aperture, 0.6 mm.; apex, 0.4 mm.

The type is in the Philadelphia Academy of Sciences collection, Cat. No. 71070, collected off Cape Florida, in 85 fathoms, by Commander Rush. Topotypes, Cat. No. 84953, U.S.N.M., were given the museum by Commander Rush.

In some of the specimens an internal opaque callous ring is observable near the apex. This is a smaller and more fusiform species than *Cadulus quadridentatus quadridentatus*, but stouter than *C. q. acompsus*. Doctor Dall's *C. amiantus* belongs to another group.

The following are the museum records.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
10	84953	Five miles off Cape Florida	85 fms. (Doctor Rush).
1	314619	Frying Pan Shoals, N. C	12½ fms. (John Ford, collector).
1	314620	do	12½ fms. (C. W. Johnson).
1	180428	North side of Abaco, Bahamas	Owen Bryant.
1	314621	South Cat Cay, Bahamas, *Eolis* Station 47	3 fms.
32	314622	North Bimini Island, Bahamas, *Eolis* Station 50	20 fms.
1	314623	Southeast of Fowey Light, Florida, *Eolis* Station 108.	38 fms.
1	314624	One mile southeast of Fowey Light, Florida, *Eolis* Station 8.	25 fms.
2	314625	Caesars Creek Bank, Florida, *Eolis* Station 40	1⅔ fms.

CADULUS (POLYSCHIDES) CAROLINENSIS Bush.

Plate 17, figs. 6, 7.

1885. *Cadulus carolinensis* Bush, Verrill's Article in Report of Com. of Fish and Fisheries for 1883, p. 587.

1885. *Cadulus carolinensis* Bush, Trans. Conn. Acad. Arts and Sci., vol. 6, pt. 2, p. 471, pl. 45, fig. 19.

1889. *Cadulus carolinensis*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 430 (excluding Old Providence record).

1889. *Cadulus carolinensis*, Dall, Bull. 37, U. S. Nat. Mus., p. 78, in part, pl. 41, fig. 19.

1898. *Cadulus* (*Polyschides*) *carolinensis*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 152, pl. 25, fig. 64; pl. 30, figs. 24–27.

1903. *Cadulus carolinensis*, Dall, Bull. 37, U. S. Nat. Mus., p. 78, in part, pl. 41, fig. 19.

The shell is of medium size, moderately curved, with its greatest diameter about one-fourth distance from the anterior aperture. There is no bulbous or local swelling. The convex side shows a fairly even arc, but flattened and accelerated from the point of maximum diameter to the anterior aperture, which is very oblique, and with a smooth rounded peristome. The concave side shows an even, gentle curvature through its posterior half, and thence it is rather straight, showing scarcely any convexity in its outline at the point of greatest diameter. The apical opening is very small and is modified by four shallow slits or notches, producing between them four short flat-topped lobes, one dorsal, one ventral, and two lateral. These apical features are often confused by the breaking, wearing down, or by some injury to the lobes. The slits are shallower than those in the other species already referred to under *Polyschides*, and show an intermediate stage between *Polyschides* and *Platyschides*. Measurements are:

Length, 9.8 mm.; maximum diameter, 1.6 mm.; anterior aperture, 1 mm.; apical aperture, .52 by .6 mm. (type).

Length, 9.7 mm.; maximim diameter, 1.45 mm.; anterior aperture, 1 mm.; apical aperture, 0.5 mm. (Pilsbry).

Length, 9.5 mm.; maximum diameter, 2 mm.; anterior aperture, 1 mm.; apical aperture, 0.4 mm. (Bush).

The type, Cat. No. 35811, U.S.N.M., was dredged at the U. S. B. F. station 2114 off Hatteras, in 14 fathoms, bottom of mud and broken shells, temperature 72° F.

This is a very abundant species about the Hatteras region in shallow water. Records show extremes of 3 fathoms in Cape Lookout Bight to 87 fathoms off Cape Hatteras. It is less abundant farther south.

The shell is easily to be distinguished from *Cadulus quadridentatus* by its greater inflation and its shallower apical slits, and from *C. tetrodon* by its larger size. There are among the many National

Museum lots shells of smaller size than that of the type, but the smallest of these are considerably larger than *C. tetrodon*.

The following are the museum records.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	35811	Off Hatteras, North Carolina, U. S. F. C. Station 2114.	14 fms., 72°, m. blk. s. (figured).
38	35811	.....do.....	Do.
81	93124	Off Hatteras, North Carolina, U. S. F. C. Station 2595.	63 fms., 75°, gy. s. brk. sh.
127	93125	Off Hatteras, North Carolina, U. S. F. C. Station 2596.	49 fms., 75°, gy. s.
3	45195	Off Hatteras, North Carolina, U. S. F. C. Station 2272.	15 fms., gy. s. brk. sh.
11	93131	Off Hatteras, North Carolina, U. S. F. C. Station 2276.	16 fms., s. sh.
61	35840	Off Hatteras, North Carolina, U. S. F. C. Station 2112.	16 fms., 73°, s. blk. sh.
3	40586	Off Hatteras, North Carolina, U. S. F. C. Station 2274.	16 fms., gy. s. brk. sh.
23	314626	Off Hatteras, North Carolina, U. S. F. C. Station 2283.	14 fms., gy. s.
93	40567	Off Hatteras, North Carolina, U. S. F. C. Station 2276.	16 fms., gy. s. brk. sh.
81	41625	Off Hatteras, North Carolina, U. S. F. C. Station 2278.	Do.
33	153664	Off Hatteras, North Carolina, U. S. F. C. Station 2277.	Do.
13	44450	Off Hatteras, North Carolina, U. S. F. C. Station 2280.	Do.
27	41443	Off Hatteras, North Carolina, U. S. F. C. Station 2292.	17 fms., gy. s. brk. sh.
6	44449	Off Hatteras, North Carolina, U. S. F. C. Station 2269.	48 fms., 77° (fragments), gy. s.
27	153666	Off Hatteras, North Carolina, U. S. F. C. Station 2113.	15 fms., 72°, m. blk. s.
1	153662	Off Hatteras, North Carolina, U. S. F. C. Station 2295.	22 fms. (fragments), crs. gy. s.
36	153665	Off Hatteras, North Carolina, U. S. F. C. Station 2276.	16 fms., gy. s. brk. sh.
77	40827	Off Hatteras, North Carolina, U. S. F. C. Station 2277.	Do.
31	153663	Off Hatteras, North Carolina, U. S. F. C. Station 2112.	16 fms., 73° (fragments), s. brk. sh.
38	45196	Off Hatteras, North Carolina, U. S. F. C. Station 2273.	17 fms., 72°, gy. s. brk. sh.
1	40803	Off Hatteras, North Carolina, U. S. F. C. Station 2290.	9 fms., s. brk. sh.
23	93132	Off Hatteras, North Carolina, U. S. F. C. Station 2597.	15 fms., crs. gy. s.
53	45197	Off Hatteras, North Carolina, U. S. F. C. Station 2275.	16 fms., gy. s. brk. sh.
9	45198	Off Hatteras, North Carolina, U. S. F. C. Station 2291.	15 fms., gy. s. brk. sh.
51	35366	Off Hatteras, North Carolina, U. S. F. C. Station 2113.	15 fms., 72°, m. brk. sh.
1	40892	Off Hatteras, North Carolina, U. S. F. C. Station 2289.	7 fms., crs. s. bk. sh.
81	250179	Off Hatteras, North Carolina, U. S. F. C. Station 2601.	107 fms., gy. s. 71.5°.
8	322683	Off Hatteras, North Carolina, U. S. F. C. Station 2275.	16 fms., gy. s. brk. sh.
1	322476	Off Hatteras, North Carolina, U. S. F. C. Station 2112.	15 fms., 73.5°, sh. bk. sh.
10	322721	Off Hatteras, North Carolina, U. S. F. C. Station 2277.	16 fms., gy. s. brk. sh.
52	198162	Off Hatteras, North Carolina, U. S. F. C. Station	16 fms.
39	329528	Off Hatteras, North Carolina, U. S. F. C. Station 2595.	63 fms., gy. s. 75°, brk. sh.
1	322852	Off Hatteras, North Carolina, U. S. F. C. Station 2296.	27 fms., crs. yl. s.
111	94247	Off Cape Lookout, North Carolina, U. S. F. C. Station 2610.	22 fms., wh. s. 78.8°.
5	92830	Off Cape Lookout, North Carolina, U. S. F. C. Station 2611.	31 fms., s. 74°, brk. sh.
6	93133	Off Cape Lookout, North Carolina, U. S. F. C. Station 2607.	18 fms., s. 73.5°, fm. gy. s.
108	92829	Off Cape Lookout, North Carolina, U. S. F. C. Station 2608.	22 fms., 78.2°, crs. gy. s.
	329955	.....do.....	Do.
	93140	.....do.....	Do.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
2	93136	Off Cape Lookout, North Carolina, U. S. F. C. Station 2612.	52 fms., 67°, crs. wh. s.
1	330174	.....do	Do.
128	314627	Off Beaufort, North Carolina, *Eolis* Station 21	6–9 fms.
1	314628	Cape Lookout, Bight, North Carolina, *Eolis* Station 20.	3 fms.
1	93137	Cape Fear, North Carolina, U. S. F. C. Station 2619.	15 fms., crs. yl. s. rot. co.
3	314629	Frying Pan Shoals, North Carolina (John Ford, collector).	12½ fms.
1	314630	Off Miami, Florida, *Eolis* Station 69	38 fms.
1	314630	.....do	Do.
1	314631	Miami, Florida, *Eolis* Station 52	
1	314632	Off Turtle Harbor, Florida, *Eolis* Station 58	50 fms.
1	314633	Off Key West, Florida, *Eolis* Station 42	60 fms.
1	314634	Tortugas (southwest channel), Florida, *Eolis* Station 36.	10 fms.
2	314635	Tortugas (southwest channel), Florida, *Eolis* Station 33.	16 fms.
6	323757	Off Mobile Bay, Alabama, U. S. B. F. Station 2389.	27 fms., gy. s. brk.
14	323217	Cape San Blas, Florida (Gulf), U. S. B. F. Station 2369.	26 fms., crs. gy. s. sh.
1	314637	West coast, Florida	30 fms.

PLATYSCHIDES, new subgenus.

The shell has two or four apical slits, which are broad and shallow, causing the resulting lobes between them to be low and wide. The type of the subgenus is *Cadulus grandis* Verrill. For enlarged drawing of apical characters of Platyschides, see plate 18, figure 13.

This group differs from *Polyschides* in the greatly reduced prominence of the apical features. The slits often amount to no more than what would appear to be chipped-out portions of the margin of the apical orifice and having between them small, sometimes pointed but always inconspicuous lobes, or these apical slits may be only very small notches. In a few species of this subgenus the apical features become so reduced it is difficult or even impossible to refer them with certainly to it. Unfortunately, injuries to the delicate apical rim often confuse the characters or obliterate them entirely, but perfect specimens of this group usually show clearly enough their characters. *Platyschides* occupies a middle ground between *Polyschides* and *Gadila*, the latter group having no modification of the simple circular rim of the apical orifice. I can not claim for *Platyschides* any great value as a biologic subdivision, but merely as a convenient means of grouping a number of species under a fairly constant character.

All attempts at making satisfactory or even useful keys to the species have been abandoned as confusing rather than helpful. Even grouping them under their finer specific characters does not seem to be very successful.

The following five species may be placed side by side by reason only of their very large size: *Cadulus grandis*, *C. elephas*, *C. spectabilis*, *C. poculum*, and *C. aequalis*.

CADULUS (PLATYSCHIDES) GRANDIS Verrill.

Plate 17, fig. 12.

1884. *Cadulus grandis* Verrill, Trans. Conn. Acad. of Arts and Sci., vol. 6, pt. 1, p. 219, vol. 6, pt. 2, pl. 44, fig. 20.

1898. *Cadulus* (*Polyschides*) *grandis*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 16, p. 154, pl. 25, fig. 66.

The shell is large, solid, senile specimens becoming thick and heavy, moderately curved, the curvature mostly in the posterior portion. The convex arc is quite regular to a point about one-third distance from the anterior aperture, thence to the anterior end the arc is more accelerated. The concave arc is greatest posteriorly, the last half of it being almost straight, and shows a very slight convexity at the anterior third or fourth section, that being the point of maximum caliber. The posterior aperture is large, giving the shell a "stumpy" appearance, even though the swelling at the anterior third or fourth is not very great. The anterior aperture is broadly elliptical and oblique and has its margin rounded in fully adult specimens. There are four apical slits, which are rounded and shallow, as compared with those in *Cadulus quadridentatus*, and leave broad flat lobes, the widest of which is on the convex side. The edge of this lobe is distinctly serrated, but all apical characters are usually more or less obliterated by accidental breaks. The lobes are also somewhat thickened within. Measurements are:

Length, 15 mm.; maximum diameter, 3.5 mm.; anterior aperture, 3 by 2.5 mm.; apical aperture, 1.3 mm. (type).

Length, 14 mm.; maximum diameter, 3 mm.; anterior aperture, 2.3 by 2 mm.; apical aperture, 1.2 mm. (U. S. B. F. Station 2217).

The type, Cat. No. 34735, U.S.N.M., was taken at U. S. B. F. Station 2076, off Martha's Vineyard, in 906 fathoms, bottom of blue mud.

This is a deep-water species from off Georges Bank to Hatteras in 843 to 1,467 fathoms, and was dredged by the *Albatross* at numerous stations, as shown by the appended table of lots in the museum collection.

This is one of the largest of the species of *Cadulus*. Some senile specimens exhibit a chalky texture beneath a glazed surface—a feature already noted in several of the abyssal *Dentalia* of the north Atlantic. It is easily recognized by its large size and "stumpy" form.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	34735	Off Martha's Vineyard, U. S. B. F. Station 2076.	906 fms., bu. m.
2	34735	Off Georges Bank, U. S. B. F. Station 2076	Do.
1	50333	Off Georges Bank, U. S. B. F. Station 2530	956 fms., gy. oz.
3	35184	Off Georges Bank, U. S. B. F. Station 2084	1,290 fms., 40° bu. m. s.
3	38669	Off Nantucket Shoals, U. S. B. F. Station 2217	924 fms., 38° gy. m.
8	78233	Off Nantucket Shoals, U. S. B. F. Station 2710	984 fms., gu. m.

[1] Type.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	38669	Off Nantucket Shoals, U. S. B. F. Station 2217	924 fms., 38.1° gy. m. (figd.)
2	153667	Off Nantucket Shoals, U. S. B. F. Station 2682	1,004 fms., gn. m. s.
3	38673	Off Martha's Vineyard, U. S. B. F. Station 2222	1,537 fms., 36° gy. oz.
1	38672	South of Block Island, U. S. B. F. Station 2210	991 fms., 38° glob. oz.
5	40258	South of Long Island, U. S. B. F. Station 2234	816 fms., 39° gn. m.
1	38668	South of Block Island, U. S. B. F. Station 2203	705 fms., 38° gn. m. s.
5	38671	South of Block Island, U. S. B. F. Station 2203	Do.
1	76836	100 miles southeast of Block Island, U. S. B. F. Station 2748	1,163 fms., 37° gn. m. form.
1	38670	South of Block Island, U. S. B. F. Station 2207	1,061 fms., 38° gn. m.
1	35417	Off Delaware Bay, U. S. B. F. Station 2103	1,091 fms., 39° glob. oz.
2	76835	100 miles southeast Delaware Bay, U. S. B. F. Station 2739	811 fms., 38° gn. m.
1	38674	Off Delaware Bay, U. S. B. F. Station 2231	965 fms., 38° gy. oz.
4	78232	Off Georges Bank, U. S. B. F. Station 2706	1,188 fms., gy. oz. form.
1	78945	80 miles east of Chesapeake, U. S. B. F. Station 2729	679 fms., 38° drk. gn. m.
1	38405	Off Hatteras, North Carolina, U. S. B. F. Station 2111	938 fms., bu. m.
4	35622	Off Hatteras, North Carolina, U. S. B. F. Station 2115	843 fms., 39° m. fne. s.

CADULUS (PLATYSCHIDES) SPECTABILIS Verrill.

Plate 17, fig. 9.

1885. *Cadulus spectabilis* VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 6, pt. 2, p. 432, pl. 44, fig. 19.

1889. *Cadulus spectabilis*, DALL, Bull. Mus. Comp. Zool., vol. 18, p. 429, in part and excluding St. Vincent record.

1889. *Cadulus spectabilis*, DALL, Bull. 37, U. S. Nat. Mus., p. 76, in part, pl. 46, fig. 19.

1898. *Cadulus* (*Polyschides*) *spectabilis*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 153, pl. 25, fig. 64, in part, and omitting St. Vincent reference.

1903. *Cadulus spectabilis* DALL, Bull. 37, U. S. Nat. Mus., p. 76, pl. 46, fig. 19, in part.

The shell is very large, solid, evenly and moderately curved, with a gibbous swelling just back of a conspicuously constricted very oblique anterior aperture. The convex arc is slightly bulged out at the point of maximum caliber, and thence dips quickly in a flattened curve to the anterior aperture. The concave arc is more strongly curved posteriorly; the second half of it is rather straight and conspicuously convex at the equator, from which point it slopes suddenly to the anterior aperture. The swelling is marked at its section of maximum diameter by an obtuse angle. The anterior aperture is flattened, especially on the dorsal margin. The apical aperture is relatively small, slightly flattened, and cut by four slits, of which the two laterals are deeper and the dorsal and ventral ones are shallow and inconspicuous. This character, as in other species of this group, is frequently confused by injury. Measurements are:

Length, 22 mm.; maximum diameter, 4 mm.; anterior aperture, 2 mm.; apical aperture, 1 mm. (type).

Length, 21.5 mm.; maximum diameter, 3.4 mm.; anterior aperture, 2 mm.; apical aperture, 1 mm. (U. S. B. F. Station 2570).

The type, Cat. No. 78626, U.S.N.M., was obtained at U. S. B. F. Station 2711, off Maryland, in 1,544 fathoms, bottom of globigerina ooze.

Other lots were taken by the *Albatross* from numerous stations off the New Jersey and Maryland coast in 1,457 to 1,859 fathoms.

This species is readily distinguished by its great size and the conspicuous obtusely angled swelling just behind the constricted aperture. It belongs to a group of very large *Caduli*, including *C. poculum*, *C. aequalis*, *C. grandis*, etc. To *C. poculum* and *C. elephas* it is closely related by reason of the extreme anterior position of the equator.

The following are the museum collection lots:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1]1	78626	Off Maryland, U. S. B. F. Station 2711	1,544 fms., glob. oz.
1	52093	Off Georges Bank, U. S. B. F. Station 2572	1,769 fms. gy. oz., 38°.
1	52092	Off Georges Bank, U. S. B. F. Station 2570	1,813 fms., 37° glob. oz.
1	78627	Off Nantucket, U. S. B. F. Station 2713	1,859 fms., br. oz.
1	38116	Off Nantucket Shoals, U. S. B. F. Station 2043	1,467 fms., 38° glob. oz.
3	78628	Off Nantucket Shoals, U. S. B. F. Station 2714	1,825 fms., br. oz.
1	78626	Off Nantucket Shoals, U. S. B. F. Station 2711	1,544 fms., glob. oz.
11	37935	Off Martha's Vineyard, U. S. B. F. Station 2221	1,525 fms., 36° gy. oz.
1	52091	200 miles southeast Martha's Vineyard, U. S. B. F. Station 2569.	1,782 fms., 37° gy. oz.
1	52090	200 miles southeast Martha's Vineyard, U. S. B. F. Station 2568.	1,781 fms., 37° gy. oz.
4	73051	Off Maryland, U. S. B. F. Station 2174	1,594 fms., gy. m.
2	78947	125 miles east of Chesapeake, U. S. B. F. Station 2723.	1,685 fms., gy. oz. form.

[1] Type.

CADULUS (PLATYSCHIDES) ELEPHAS, new species.

Plate 17, fig. 10.

1889. *Cadulus spectabilis*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 429, in part.

1889. *Cadulus spectabilis*, Dall, Bull. 37, U. S. Nat. Mus., p. 76, in part and not including figure.

1898. *Cadulus* (*Polyschides*) *spectabilis*, Pilsbry and Sharp, Tryon's Man. of Conch., vol. 17, p. 153, in part and not including figure.

1903. *Cadulus spectabilis*, Dall, Bull. 37, U. S. Nat. Mus., p. 76, in part and not including figure.

The shell is very large, solid, and heavy, rather strongly curved in the posterior portion and with the section of greatest diameter immediately back of a constricted oblique anterior aperture, which is at about the anterior fifth or sixth. The convex side forms a regular arch to the equator, and thence a straight sharp descent to the anterior aperture over a flattened surface. The concave line is more deeply arched in the posterior portion and then quite straight throughout the anterior third. It is not bulged out at the equator. The equator is obscurely marked by an obtuse angle. The anterior aperture is slightly flattened into a rounded oval outline. The apical orifice is relatively large, round, and thickened within. The color is cream white or ivory, instead of the bluish white usual in the Caduli.

The apical features are not well shown on the unique specimen, but dorsal and ventral widely chipped out notches are indicated. Measurements are:

Length, 17.5 mm.; diameter, 2.8 by 2.5 mm.; anterior aperture, 2.1 by 2 mm.; apical aperture, 1.4 mm.

The type is in the Museum of Comparative Zoology, Cambridge, Cat. No. 7741, and was dredged by the *Blake* at United States Coast Survey Station 230, off St. Vincent, West Indies, 464 fathoms, bottom of fine sand, temperature 41½° F. There are no specimens in the United States National Museum.

This species was referred by Doctor Dall and later by Pilsbry and Sharp to Verrill's *Cadulus spectabilis*. It is closely related to that species, but the shell is smaller and more curved and has a larger apical orifice and smaller section at its equator. The extreme anterior position of the equator makes the resemblance the more striking. In this respect it also resembles *C. poculum*, but it has, on the other hand, a much larger shell. It is also larger than *C. aequalis*, another of the large *Caduli* of this same group. The ivory white color may be no more than an individual feature, but if it proves to be a constant one it might be accepted as a specific character of some importance.

CADULUS (PLATYSCHIDES) POCULUM Dall.

Plate 17, fig. 8.

1889. *Cadulus poculum* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 429.
1889. *Cadulus poculum* Dall, Bull. 37, U. S. Nat. Mus., p. 76.
1898. *Cadulus (Gadila) poculum*, Pilsbry and Sharp, Tryon's Man. Conch., vol 17, p. 172, pl. 33, figs. 56, 57.

The shell is slender and strongly arcuate, especially in the posterior portion; it has a rather gibbous swelling, with an obtuse angled equator, especially noticeable on the convex side, at a point only about one-fifth the distance from its extremely oblique anterior aperture. Between the equator and the anterior aperture the shell is very conspicuously flattened "like the mouth of a whistle." The convex side shows a regular and rather strong curve to the point of maximum caliber at the obtusely angled equator, but thence on the anterior aperture along the flattened compressed surface of the shell it describes a straight line, even across the aperture to the opposite side. The concave side shows a strongly curved outline throughout its posterior half, but a less curved one anteriorly with a point of slight convexity at the swelling just back of the aperture. From the equator the shell posteriorly is slightly flattened, slender, and evenly tapering to a small apical orifice. The anterior aperture is very oblique (quite 45°) and transversely elliptical. The apical features are not clearly shown in the few museum specimens, but lateral projections from the margin of the orifice would indicate characters similar to those of *Cadulus pandionis;* that is, shallow circular cuts extending across the dorsal and ventral sides of the rim, leaving between them pointed lateral projections. Measurements are:

Length, 13.2 mm.; diameter, 2 by 2.5 mm.; anterior aperture, 1.75 mm.; apical aperture, 0.63 mm. (Dall).

Length, 12.2 mm.; diameter, 2.11 by 2.45 mm.; anterior aperture, 1.2 by 1.65 mm.; apical aperture, 0.83 mm.

Length, 12 mm.; diameter, 1.90 by 2.20 mm.; anterior aperture, 1.40 by 1.20 mm. (type).

The type, Cat. No. 95374, U. S. N. M., is from a lot of two specimens collected by the *Blake* at United States Coast Survey Station 226, off St. Vincent, in 424 fathoms, bottom of fine dark sand and temperature of 42.5° F.

In the museum collection is one other lot, Cat. No. 95380, U. S. N. M., consisting of a single abnormal specimen, also collected by the *Blake*, United States Coast Survey Station not recorded, in 640 fathoms, off Yucatan Bank.

CADULUS (PLATYSCHIDES) AEQUALIS Dall.

Plate 17, fig. 11.

1881. *Cadulus aequalis* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 34.
1889. *Cadulus aequalis* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 429, pl. 27, fig. 9.
1889. *Cadulus aequalis* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 9.
1898. *Cadulus (Gadila) aequalis*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 170, pl. 25, fig. 48.
1903. *Cadulus aequalis* Dall, Bull. 37, U. S. Nat. Mus., p. 76, pl. 27, fig. 9.

The shell is very large and moderately curved, with scarcely any perceptible swelling; the greatest diameter lies within the anterior fifth portion of the shell. The convex side curves regularly to a point just back of the anterior aperture, and thence for the short remaining distance to the aperture it is a straight line. The concave outline is quite regular throughout; its posterior portion perhaps showing a slightly greater degree of curvature. The anterior aperture is a little oblique, somewhat constricted, and almost round. The apical orifice is round and relatively large. No apical features are observable in the two museum specimens.

The type, Cat. No. 95373, U.S.N.M., is from a lot of two specimens taken by the *Blake* at United States Coast Survey Station 43, off Tortugas, in 339 fathoms, bottom temperature 45° F. It measures - length, 15 mm.; maximum diameter, 2.5 mm.; anterior aperture, 2 mm.; apical aperture, 1 mm.

This is the unique museum record. A Philadelphia Academy of Natural Sciences specimen, collected by Commander Rush on the "E. coast of Florida," is apparently referable to this species. The species is distinguished by its lack of most of the usual features of the genus. Indeed, it is a shell that might easily be mistaken for a *Dentalium*.

The following five species of *Cadulus* may be placed together by reason of all possessing relatively large apical orifices: *C. agassizii*, *C. catharus*, *C. parvus*, *C. foweyensis*, *C. portoricensis*.

CADULUS (PLATYSCHIDES) AGASSIZII Dall.

Plate 18, figs. 1, 3.

1881. *Cadulus agassizii* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 35.
1889. *Cadulus agassizii* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 430.
1889. *Cadulus agassizii* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 12 (*c*).
1898. *Cadulus* (*Gadila*) *agassizii*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 168, pl. 25, fig. 57.
1898. *Cadulus agassizii hatterasensis* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 169, pl. 33, figs. 50–54.

The shell is fairly solid, moderately curved, and having its maximum diameter, which is not bulbous, at about the anterior third. The anterior aperture is constricted, oblique, and round. The apical orifice is slightly flattened and comparatively large, often seemingly as large as the other aperture. The convex arc is almost flat along the anterior half of the shell and is slightly bulged out at its point of maximum diameter. The swelling, however, is a gradual one and unmarked by any prominent equator or angle. Posteriorly the shell is not much attenuated, but terminates in a large, open, and slightly flattened apical orifice. The apical features consist of four very broad, shallow slits that form as many indistinctly marked lobes; the one on the concave side is the broadest, the lateral ones being reduced to mere points; the dorsal one is rather broad and bluntly pointed. In many specimens, however, only the lateral points on the rim of the apical orifice are noticeable. Measurements are:

Length, 9 mm.; maximum diameter, 2 mm.; anterior aperture, 1.25 mm.; apical aperture, 0.75 mm. (type)

Length, 8.75 mm.; maximum diameter, 1.75 mm.; anterior aperture, 1.10 mm.; apical aperture, 0.75 mm. (Sand Key).

The type is in the Museum of Comparative Zoology, Cat. No. 7746, and was taken by the *Blake* at United States Coast Survey Station 5, south of Marquesas Key, Florida, in 229 fathoms, bottom temperature 49.5° F.

This is a very abundant species in the Florida Keys region in from 75 to 299 fathoms, and also from the Hatteras region in from 87 to 293 fathoms ("*Cadulus agassizii hatterasensis*").

About 80 lots containing many hundreds of excellent specimens from the Gulf Stream edge along the lower Florida coast which have recently been received, together with some additional lots from the Hatteras region now in the museum collection, make possible a closer study of this species than was heretofore the case. The lack of sufficient characters to maintain Doctor Pilsbry's subspecies is evident. *C. agassizii* has not the bent "dog tooth" aspect of *C. pandionis*, with which it seems to have been confused. In general, the characteristic feature of the species is the very large and flattened apical orifice, suggesting a shell normally possessed of a longer neck, a portion of which has been accidentally broken off, leaving a somewhat wide and jagged opening. In examining but one or two specimens the real apical features would almost certainly be overlooked, as the rim of the apical orifice is generally chipped and more or less injured. The examination of many specimens under a glass soon suggests a certain plan or design in the apical breaks. It finally becomes clearly apparent that the uniformity in the mode of breakage is due to the projection of the four lobes already referred to.

The following are the lots in the museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	103463	Off Chesapeake Bay, U. S. F. C. Station 2265	70 fms., 57.9° gn. m., g.
1	314638	Off Hatteras, North Carolina (John Ford collection).	293 fms.
3	329451	Off Hatteras, North Carolina, U. S. B. F. Station 2592.	120 fms., gy. s., 58°.
24	93123	do	Do.
1	93146	Off Hatteras, North Carolina (22 miles east southeast), U. S. B. F. Station 2595.	63 fms., 75°, gy. s., brk. sh.
28	329904	Off Hatteras, North Carolina, U. S. B. F. Station 2600.	87 fms., gy. s., 71.5°.
107	94248	Off Hatteras, North Carolina (36 miles south ½ west), U. S. B. F. Station 2601.	107 fms., gy. s., 67.4°.
1	329908	Off Hatteras, North Carolina, U. S. B. F. Station 2602.	124 fms., s. r., 61°.
42	92126	Off Hatteras, North Carolina (36 miles south ½ west), U. S. B. F. Station 2602.	124 fms., s. r., 61°.
7	314639	Off Florida Keys, U. S. B. F. Stations 2639–47	56–217 fms., co. s.
27	93129	Off Cape Fear (25 miles east southeast), U. S. B. F. Station 2614.	17 fms., gy. s.
1	93130	Off Cape Fear (27 miles east southeast), U. S. B. F. Station 2615.	18 fms., gy. s.
2	94078	Off South Carolina, U. S. B. F. Station 2314	159 fms., 47.4°, crs. s., bk. sp.
3	94127	Off South Carolina, U. S. B. F. Station 2316	99 fms., s., 57.2°.
8	314640 314640	Miami, Florida, off Government Cut, *Eolis* Station 311.	75 fms.
12	314641	Miami Florida, off Government Cut, *Eolis* Station 103.	20 fms.
10	314642	Miami, Florida, off Government Cut, *Eolis* Station 82.	83 fms.
1	314643	Off Fowey Light, Florida, *Eolis* Station 153	
6	314644	Off Fowey Light, Florida, *Eolis* Station 178	68 fms.
95	314645	Off Fowey Light, Florida, *Eolis* Station 361	75–100 fms.
74	314646	Off Fowey Light, Florida, *Eolis* Station 374	85 fms.
9	314647	Off Fowey Light, Florida, *Eolis* Station 363	85 fms.
19	314648	Off Fowey Light, Florida, *Eolis* Station 364	75–90 fms.
82	314649	Off Fowey Light, Florida, *Eolis* Station 356	55 fms.
11	314650	Off Fowey Light, Florida, *Eolis* Station 360	100 fms.
60	314651	Off Fowey Light, Florida, *Eolis* Station 362	95 fms.
114	314652	Off Fowey Light, Florida, *Eolis* Station 375	75–90 fms.
2	314653	Off Fowey Light, Florida, *Eolis* Station 357	45 fms.
6	314654	Off Fowey Light, Florida, *Eolis* Station 177	60 fms.
34	314655	Off Fowey Light, Florida, *Eolis* Station 174	58 fms.
147	314656	Off Fowey Light, Florida, *Eolis* Station 355	70 fms.
52	314657	Off Fowey Light, Florida, *Eolis* Station 169	70 fms.
128	314658	Off Fowey Light, Florida, *Eolis* Station 352	90 fms.
2	314659	Off Fowey Light, Florida, *Eolis* Station 176	52 fms.
6	314660	Off Fowey Light, Florida, *Eolis* Station 182	75 fms.
20	314661	Off Fowey Light, Florida, *Eolis* Station 165	78 fms.
3	314662	Off Fowey Light, Florida, *Eolis* Station 179	70 fms.
13	314663	Off Fowey Light, Florida, *Eolis* Station 307	70 fms.
51	314664	Off Fowey Light, Florida, *Eolis* Station 353	85 fms.
18	314665	Off Fowey Light, Florida, *Eolis* Station 181	71 fms.
72	314666	Off Fowey Light, Florida, *Eolis* Station 354	80 fms.
15	314667	Off Fowey Light, Florida, *Eolis* Station 183	80 fms.
171	314668	Off Fowey Light, Florida, *Eolis* Station 373	70–90 fms.
5	314669	Off Fowey Light, Florida, *Eolis* Station 186	68 fms.
57	314670	Off Fowey Light, Florida, *Eolis* Station 382	70 fms.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
10	314671	Off Cape Florida, *Eolis* Station 189	67 fms.
33	314672	Off Ragged Key, Florida, *Eolis* Station 193	80 fms.
5	314673	Off Ragged Key, Florida, *Eolis* Station 365	75 fms.
50	314674	Off Ragged Key, Florida, *Eolis* Station 366	75–90 fms.
9	314675	Off Ragged Key, Florida, *Eolis* Station 192	75 fms.
75	314676	Off Ajax Reef, Florida, *Eolis* Station 137	40 fms.
5	314677	Off Ajax Reef, Florida, *Eolis* Station 369	80–100 fms.
39	314678	Off Ajax Reef, Florida, *Eolis* Station 370	70–90 fms.
192	314679	Triumph Reef, Florida, *Eolis* Station 350	70–90 fms.
83	314680	Caesar's Creek, Florida, *Eolis* Station 376	90 fms.
16	314681	Sambo Reef, Florida, *Eolis* Station 329	135 fms.
6	314682	Sambo Reef, Florida, *Eolis* Station 331	118 fms.
1	314683	Off Sambo Reef, Florida, *Eolis* Station 330	120 fms.
9	314684	Off Sambo Reef, Florida, *Eolis* Station 332	115 fms.
14	314685	Off Western Dry Rocks, *Eolis* Station 318	95 fms.
26	314686	Off Western Dry Rocks, *Eolis* Station 320	80 fms.
44	314687	Off Western Dry Rocks, *Eolis* Station 319	90 fms.
38	314688	Off Key West, Florida, *Eolis* Station 334	90 fms.
18	314689	Off Key West, Florida, *Eolis* Station 333	110 fms.
12	314690	Off Key West, Florida, *Eolis* Station 315	87 fms.
3	314691	Off Key West, Florida, *Eolis* Station 314	75 fms.
21	314692	Off Key West, Florida, *Eolis* Station 31	90 fms.
33	314693	Off Key West, Florida, *Eolis* Station 334	90 fms.
30	314694	Off Key West, Florida, *Eolis* Station 146	98 fms.
14	314695	Off Key West, Florida, *Eolis* Station 384	75–80 fms.
2	314696	Sand Key, Florida, *Eolis* Station 98	70–90 fms.
2	314697	Sand Key, Florida, *Eolis* Station 316	120 fms.
15	314698	Sand Key, Florida, *Eolis* Station 326	75 fms.
9	314699	Sand Key, Florida, *Eolis* Station 302	100 fms.
15	314700	Sand Key, Florida, *Eolis* Station 322	115 fms.
33	314701	Sand Key, Florida, *Eolis* Station 164	92 fms.
17	314702	Off Sand Key, Florida, *Eolis* Station 6	35 fms., s. brk. sh.
18	314703	Off Sand Key, Florida, *Eolis* Station 325	95 fms.
2	314704	Off Sank Key, Florida, *Eolis* Station 56	70 fms.
57	314705	Off Sand Key, Florida, *Eolis* Station 323	110 fms.
4	314706	Off Sand Key, Florida, *Eolis* Station 100	65 fms.
27	314707	Off Sand Key, Florida, *Eolis* Station 324	100 fms.
1	314708	Off Sand Key, Florida, *Eolis* Station 161	76 fms.
39	314709	Off Sand Key, Florida, *Eolis* Station 338	85 fms.
8	314710	Off Sand Key, Florida, *Eolis* Station 163	85 fms.
50	314711	Off Sand Key, Florida, *Eolis* Station 337	90 fms.

CADULUS (PLATYSCHIDES) CATHARUS, new species.

Plate 18, fig. 5.

The shell is rather solid, moderately curved, with its maximum diameter almost exactly median, where it is slightly bulged with just a suggestion of a bluntly carinated equator. The anterior aperture is very oblique, dorso-ventrally oval; its peristome is sharp, slightly constricted, and bordered on the outside by a flattened space as though "hollow ground." Within, it is encircled by an opaque white callus. The posterior orifice is relatively large, somewhat flaring, and a little flattened. The convex arc describes a regular curve unmodified by the equatorial expansion. The concave arc is reduced to an almost straight line, interrupted only by a slight bulge at the median equator. The posterior portion of the shell is not attenuated but free and large. Apical features, while not well shown in the type, are probably typical of the subgenus.

The type is in the State University of Iowa collection and was dredged by the expedition of that university of 1898, at the S. U. I. Station 115, off English Harbor, Antigua, in 120 fathoms. It measures: Length, 8.6 mm.; diameter, 2 by 1.75 mm.; anterior aperture, 1 by 1.2 mm.; apical aperture, 0.75 by 1 mm.

There are no examples in the National Museum collection. The median position of the equator, the localized swelling, the oval aperture, and the flattened, large apical orifice, are the chief characters of the species. A medium-power lens shows in an oblique light five transverse scratches on the polished vitreous surface, but these are hardly sufficient for diagnostic value. Its nearest ally is probably *Cadulus agassizii*, from which species, however, the median equator of *C. catharus* separates it.

CADULUS (PLATYSCHIDES) PARVUS, new species.

Plate 18, figs. 2, 4.

1889. *Cadulus amiantus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 431, in part and omitting figure.
1889. *Cadulus amiantus* Dall, Bull. 37, U. S. Nat. Mus., p. 78.
1898. *Cadulus amiantus*, Pilsbry and Sharp, Tryon's Man. of Conch., vol. 17, p. 174, in part and omitting figure.
1903. *Cadulus amiantus* Dall, Bull. 37, U. S. Nat. Mus., p. 78.

A few lots in the National Museum collection that have been referred to *Cadulus amiantus*, together with some recently added lots from the Florida Keys region and from Barbados, upon careful comparison with the type of *C. amiantus*, must be renamed.

The following description is from a Barbados specimen: The shell is small, with a large, open, and gaping apical orifice and an oblique anterior aperture, very little, if any, larger than the posterior orifice. The equator is about median and without any local swelling. The convex outline forms a fairly regular arch, though it is somewhat flattened anteriorly. The concave outline is marked by a slight convexity at the equator. The shell is a little flattened on the concave side near the apical orifice and in the extreme posterior portion, imparting to it an oval shape; within this opening are some callous rings. The apical opening is modified by some shallow slits and broad, ill-defined lobes. Measurements are:

Length, 5.8 mm.; diameter, 1.1 mm.; anterior aperture, 0.8 mm.; apical aperture, 0.7 mm. (type).

Length, 5.5 mm.; diameter, 1.05 mm.; anterior aperture, 0.8 mm.; apical aperture, 0.7 mm.

Length, 6 mm.; diameter, 1.1 mm.; anterior aperture, 0.8 mm.; apical aperture, 0.8 mm.

This species groups with *C. agassizii* by reason of possessing the same flattened, large, and gaping posterior orifice, with an identical arrangement of apical slits. The chief difference lies in the smaller size of *C. parvus*, some specimens of which may slightly exceed 6 mm. in length, but the smallest *C. agassizii* are about 7 mm., with an average of 8 to 9 mm. in length, and they are, besides this, proportionally somewhat stouter and more inflated. Another difference lies in that the equator is more median in *C. parvus*.

The type, Cat. No. 95377 (*a*), U.S.N.M., was taken by the *Blake*, United States Coast Survey Station not given, off Barbados, in 100 fathoms.

A Yucatan specimen of *C. parvus*, from the great depth of 1,002 fathoms, can be explained by the steepness of the Yucatan continental slope and the likelihood of finding dead mollusks belonging to shallower stations that have been swept out to greater depth. A number of the Barbados specimens are slightly smaller than the type, and may indicate a sexual character, as the Barbadian lots often contain examples of both. At all events, I do not believe the slightly smaller shells are separable from the others, even subspecifically.

The following are the museum collection records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	314713	Barbados, U. S. C. S. Station ?	100 fms.
1	314714	Fowey Light, Florida, *Eolis* Station 356	55 fms.
1	314715	Fowey Light, Florida, *Eolis* Station 354	80 fms.
1	314716	Fowey Light, Florida, *Eolis* Station 155	43 fms.
2	314717	Fowey Light, Florida, *Eolis* Station 364	75–90 fms.
1	314718	Fowey Light, Florida, *Eolis* Station 176	52 fms.
1	314719	Fowey Light, Florida, *Eolis* Station 350	70–90 fms.
1	314720	Key West, Florida, *Eolis* Station 384	75–80 fms.
1	95378	Off Cape San Antonio, *Blake* Station	1,002 fms.
5	314919	Barbados, Iowa State University Station 3	75–80 fms.
3	314920	Barbados, Iowa State University Station 13	80 fms.
1	314921	Antigua, Iowa State University Station 115	120 fms.
5	314922	Barbados, Iowa State University Station 27	85–90 fms.
1	314923	Barbados, Iowa State University Station 61	33 fms.
2	314924	Barbados, Iowa State University Station 44	90–100 fms.

[1] Type.

CADULUS (PLATYSCHIDES) FOWEYENSIS, new species.

Plate 18, figs. 7, 13.

The shell is slender, slightly curved, very slowly enlarging from a comparatively large apical opening to the maximum section located one-fifth distance from the anterior aperture, thence it tapers moderately the remaining short distance to the relatively small contracted and oblique aperture. The shape is that of a long-necked large-mouth flask. The convex side is almost straight throughout its posterior half, and thence evenly arched to the aperture, only showing a slight prominence at the equator, just back of the anterior aperture. The concave side, on the contrary, is almost straight in its anterior half and thence evenly arched the balance of the way to the apical orifice. There are numerous opaque rings about the shell, especially near the posterior end, each ring being a slight thickening of the shell. The apical opening is wide and rather flaring, a very little flattened, and cut by four very shallow broad fissures, dividing the apical rim into four ill-defined lobes, the one on the convex side being slightly projecting and pointed, the lateral ones small, and the fourth one on the concave side being broad, low, and flat. It is unusual to find any one specimen showing all these lobes in good condition.

The type, Cat. No. 314721, U.S.N.M., was dredged at *Eolis* Station 350, off Triumph Reef, Florida, in 90 fathoms. It measures—length, 7 mm.; maximum diameter, 1.10 mm.; anterior aperture, 0.75 mm.; apical aperture, 0.60 mm.

There are also eight lots from off Fowey Light, Florida, in 55 to 90 fathoms, sandy mud bottom.

This is an easily recognized species of apparently very restricted range. The chief distinguishing character is the long produced "neck" of large diameter terminating in the large and somewhat flaring apical opening.

The museum collection contains the following lots:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314721	Triumph Reef, Florida, *Eolis* Station 350	70-90 fms. (type).
2	314722	Fowey Light, Florida, *Eolis* Station 352	90 fms.
2	314723	Fowey Light, Florida, *Eolis* Station 373	70-90 fms.
1	314724	Fowey Light, Florida, *Eolis* Station 356	55 fms.
2	314725	Fowey Light, Florida, *Eolis* Station 364	75-90 fms.
1	314726	Fowey Light, Florida, *Eolis* Station 374	85 fms.
1	314727	Ragged Key, Florida, *Eolis* Station 365	75 fms.
1	314728	Caesars Creek Bank, Florida, *Eolis* Station 376	90 fms.

CADULUS (PLATYSCHIDES) PORTORICENSIS, new species.

Plate 18, fig. 6.

The shell is small, moderately curved, with greatest diameter at about the anterior third. There is no bulbous or local swelling, and the exact position of the equator is not very obvious. The convex side shows a rather even arc, but little modified between the equator and anterior aperture. The concave side is moderately arched in the posterior third, the balance being about straight, with a very slight convexity in the region of the equator. The cylinder is in general round, but it is slightly compressed laterally at the apical end, giving that orifice a rounded oval outline. The anterior aperture is oblique, with its peristome rounded and smooth. The apical features in the unique museum specimen show a possible *Polyschides* type, though modified, as in *Cadulus carolinensis*, to occupy an intermediate stage between *Platyschides* and *Polyschides*. There are four shallow slits creating as many lobes.

The type, Cat. No. 314712, U.S.N.M., was obtained at U. S. B. F. Station 6062, in Mayaguez Harbor, Porto Rico, in 25 fathoms.

bottom of sand, mud and shells, temperature 75.8° F., and is the unique specimen. It measures—length, 7 mm.; diameter, 1 mm.; anterior aperture, 0.85 mm.; apical aperture, 0.5 mm.

This little *Cadulus* is removed from a lot of *C. nitidus* taken in Mayaguez roadstead. Its affiliations would appear to be with *C. carolinensis*, from which it differs chiefly in being smaller. In general shape it is of the group of *Caduli* that have no definite equator nor prominent localized swelling. Some uncertainty attaches to the apical features, which I hope may be removed by receipt of better material.

The following five species are characterized by a bent or crooked appearance, chiefly caused by the obliquity of the anterior aperture, together with an anterior position of the equator—a "dog-tooth" shape so often referred to by authors: *Cadulus rushii*, *C. pandionis*, *C. watsoni*, *C. vulpidens*, *C. providensis*.

CADULUS (PLATYSCHIDES) RUSHII Pilsbry and Sharp.

1898. *Cadulus* (*Gadila*) *rushii* Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 168, pl. 27, figs. 94–97.

The shell is moderately solid, the typical subspecies being large (11.5 mm.), another subspecies smaller (8.3 mm.). It is moderately curved, chiefly posteriorly, the convex side evenly arched throughout, though slightly accentuated at the equator, which is about one-fourth the distance from the anterior aperture. The concave side is nearly straight in the anterior half, but decidedly arched posteriorly; the section of greatest diameter is about one-fourth distance back of the anterior aperture, where the shell has a diffused moderate swelling, though not bulbous or gibbous. The entire shell is dorso-ventrally compressed, but less so at the two apertures. The larger aperture is oblique with a rounded peristome. The apical orifice is a little oval, with the rim indistinctly cut by four slits, leaving as many low flat lobes, the dorsal and ventral ones being the broadest, the former with an obtuse angle, the latter flat-topped and slightly flaring out. These features can rarely be observed in any single specimen, owing to accidental breaks. Measurements are:

Length, 11.6 mm.; maximum diameter, 2 by 1.8 mm.; anterior aperture, 1.6 by 1.4 mm.; apical aperture, 0.6 by 0.53 mm. (Type of *Cadulus rushii rushii*.)

Length, 8.3 mm.; maximum diameter, 1.3 mm.; anterior aperture, 1.2 mm.; apical aperture, 0.8 mm. (Type of *C. r. arne*.)

This is a fairly deep-water species, ranging from off Cape Hatteras to Nantucket, in 293 to 1,060 fathoms.

C. rushii occupies an intermediate position between *C. agassizii*, with the flattened, wide flaring posterior aperture of that species, and *C. pandionis*, with its longer, curved neck, and small apical orifice. It begins to assume the crooked appearance of *C. pandionis*, but differs again in its apical features. It is larger than *C. agassizii* and appears to inhabit a somewhat deeper water zone.

CADULUS (PLATYSCHIDES) RUSHII RUSHII Pilsbry and Sharp.

Plate 18, fig. 15.

This typical subspecies includes the larger forms described under *Cadulus rushii*, with a type measurement of—length, 11.6 mm.; diameter, 2 by 1.8 mm.; anterior aperture, 1.6 by 1.4 mm.; apical aperture, 0.6 by 0.53 mm.

The type is in the collection of the Philadelphia Academy of Sciences and was collected by Commander Rush, United States Navy, off Cape Hatteras, in 293 fathoms.

The following are the lots in the National Museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
4	190651	Marthas Vineyard, U. S. B. F. Station 1093	349 fms., 40°, bu. m. s.
6	202826	.....do	Do.
5	38177	.....do	Do.
7	203223	.....do	Do.
1	38682	Marthas Vineyard, U. S. B. F. Station 2222	1,537 fms., 36.9°, gy. oz.
1	202960	.....do	Do.
4	78237	Off Nantucket, U. S. B. F. Station 2710	984 fms., gn. m.
2	38675	Off Nantucket, U. S. B. F. Station 2192	1,060 fms., gn. oz. st.
7	202958	Off Block Island, U. S. B. F. Station 2203	705 fms., 38.9°, gn. m. s.
4	38676	.....do	Do.
1	202957	.....do	Do.
1	76663	Off Block Island, U. S. B. F. Station 2207	1,061 fms., 38.6°, gn. m.
3	203222	Off Marthas Vineyard, U. S. B. F. Station 999	266 fms., gn. m.
2	38769	Off Marthas Vineyard, U. S. B. F. Station 2212	428 fms., 40°, gn. m.
1	38655	Off Marthas Vineyard, U. S. B. F. Station 999	266 fms., gn. m.
1	50379	Off Georges Bank, U. S. B. F. Station 2529	662 fms., 39°, gn. m.
2	38648	Off Marthas Vineyard, U. S. B. F. Station 894	365 fms., 40°, br. m.
1	53009	Off Marthas Vineyard, U. S. B. F. Station 2581	394 fms., gn. m.
2	38647	Off Marthas Vineyard, U. S. B. F. Station 892	487 fms., br. m. s.
2	53077	Georges Bank, U. S. B. F. Station 2586	328 fms., 40.5°, gy. m.
1	38654	Off Marthas Vineyard, U. S. B. F. Station 997	335 fms., 40°, yl. m.
2	38652	Off Marthas Vineyard, U. S. B. F. Station 947	319 fms., 44°, s., m.
1	38656	Off Marthas Vineyard, U. S. B. F. Station 1028	410 fms., 41°, yl. m.
18	38680	Off Marthas Vineyard, U. S. B. F. Station 2213	384 fms., 39.5°, gn. m.
1	151910	Off Marthas Vineyard, U. S. B. F. Station 2547	390 fms., 40°, gn. m.
10	51160	.....do	Do.
6	202996	.....do	Do.
1	40240	South of Long Island, U. S. B. F. Station 2234	816 fms., 39°, gn. m.
1	202959	.....do	Do.
1	202838	Off Marthas Vineyard, U. S. B. F. Station 895	238 fms., 42°, sft. m.
2	202827	Off Marthas Vineyard, U. S. B. F. Station 1095	321 fms., 40°, gn. m.
1	202937	Off Nantucket, U. S. B. F. Station 2192	1,060 fms., 38.6°, gn. oz.
1	78236	Off New Jersey, U. S. B. F. Station 2709	866 fms., br. m.
2	203006	.....do	Do.
9	78237	Off New Jersey, U. S. B. F. Station 2710	984 ms., gn. m.
1	78948	Chesapeake Bay, U. S. B. F. Station 2729	679 fms., 38.5°, gn. For. oz.
1	202825	Chesapeake Bay, U. S. B. F. Station 898	300 fms., 44°, m.
3	38102	.....do	Do.
7	43986	Chesapeake Bay, U. S. B. F. Station 2263	430 fms., gn. m.
1	202956	.....do	Do.
2	35765	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2111.	938 fms., gn. m.
20	35623	Off Cape Hatteras, North Carolina, U. S. B. F. Station 2115.	843 fms., 39°, m., s.
4	94295	Off Cape Hatteras, North Carolina, *Blake* Station 35.	300 fms., gn. m. (Rush).

CADULUS (PLATYSCHIDES) RUSHII ARNE, new subspecies.

Plate 18, fig. 9.

This is a smaller form than *Cadulus rushii rushii* and hardly to be distinguished from it except in the matter of size, but the difference is sufficiently persistent to warrant a separation. Geographically it occupies the same range. The apical features of the shell are remarkably well shown in some specimens. These consist of four shallow slits and four lobes, the dorsal and ventral lobes low and broad, the lateral ones narrow, triangular, and pointed.

The type, Cat. No. 314729, U.S.N.M., measures—length, 8.3 mm.; diameter, 1.3 mm.; anterior aperture, 1.2 mm.; apical aperture, 0.8 mm. It was dredged at the U. S. B. F. Station 2234, off New Jersey, in 810 fathoms, bottom of green mud, temperature 38.6°.

The following are the National Museum lots:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 5	314729	Latitude 30–09–00, longitude 72–03–05, U. S. B. F. Station 2234.	810 fms., 38.6°, gn. m.
1	78237	Off New Jersey, U. S. B. F. Station 2710	984 fms., gn. m. (figd. specimen).
1	78237	do	984 fms., gn. m.
2	314730	Latitude 39–58–30, longitude 70–30–00, U. S. B. F. Station 2213.	384 fms., gn. m.
1	53084	Off Marthas Vineyard, U. S. B. F. Station 2584	541 fms., 40°, drk. gy. m.
2	38122	Off Marthas Vineyard, U. S. B. F. Station 2092	197 fms., 45°, gn. m.
1	314731	Off Marthas Vineyard, U. S. B. F. Station 1093	349 fms., br. m., s., 40°.
1	38677	South of Block Island, U. S. B. F. Station 2203	705 fms., 39°, gn. m., s.
1	53084	Off Marthas Vineyard, U. S. B. F. Station 2547	390 fms., 40°, gn. m.
2	78235	Off Block Island, U. S. B. F. Station 2689	525 fms., gn. m.
2	38660	Marthas Vineyard, U. S. B. F. Station 1140	374 fms., sft. m., p.
2	78237	Off New Jersey, U. S. B. F. Station 2710	984 fms., gn. m.
1	78630	Off Cape May, U. S. B. F. Station 2722	594 fms., gn. m.
2	78629	Off Maryland, U. S. B. F. Station 2721	813 fms., gy. oz.

[1] Type.

CADULUS (PLATYSCHIDES) PANDIONIS Verrill and Smith.

Plate 18, fig. 10.

1880. *Cadulus pandionis* (Verrill and Smith) Verrill, Amer. Journ. Sci., vol. 20, pp. 392, 399.

1880. *Cadulus pandionis* Verrill and Smith, Proc. U. S. Nat. Mus., vol. 3, p. 395.

1882. *Cadulus pandionis* Verrill, Trans. Conn. Acad. Arts and Sci., vol. 5, p. 558, pl. 58, figs. 30, 30 (*a*).

1885. *Cadulus pandionis* Verrill, Rep. of Com. Fish and Fisheries for 1883, Article 16, p. 573. Also Bush. Rep. of above, Art. 17, p. 717.

1898. *Cadulus* (*Gadila*) *pandionis*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 171, pl. 25, fig. 63.

1915. *Cadulus pandionis*, Johnson, Occ. Papers of Boston Soc. Nat. Hist., vol. 7, No. 13, Moll., p. 84.

The shell is large (10 to 11 mm.), strongly curved, gradually accelerating in diameter from a small apical orifice to the equator, at which point there is a considerable swelling, especially on the convex side; the section of maximum size is about one-third distance from the anterior aperture; the convex side describes a strong curve, but slightly interrupted at the equator, from which point the outline is straighter in its descent to the larger aperture. The concave side is more strongly curved posteriorly and shows at the point of maximum diameter a slight local convexity. The anterior aperture is oblique, with rounded peristome. The entire shell is somewhat flattened. When viewed upon its convex or concave side the shell is decidedly fusiform. The apical orifice is relatively small and its rim is modified by two semicircular shallow wide notches, dorsal and ventral, leaving two lateral bluntly pointed lobes. These are not, however, like the deep narrow lateral notches of the subgenus *Dischides.* Measurements are:

Length, 10 mm.; maximum diameter, 2.25 mm.; anterior aperture, 1.75 mm.; apical aperture, 0.4 mm. (Type).

Length, 11 mm.; maximum diameter, 2 mm.; anterior aperture, 1.40 mm.; apical aperture, 0.6 mm. (Florida).

The type, Cat. No. 38644, U.S.N.M., was dredged by the *Fish Hawk* at U. S. B. F. Station 876 off Marthas Vineyard, in 120 fathoms, bottom of soft, sticky mud, temperature 53° F.

In the museum collection are lots from off Marthas Vineyard and Nantucket, in 85 to 386 fathoms; also from the Florida Keys region and off Cape Florida and Fowey Light, in 70 to 200 fathoms.

The Florida specimens are altogether typical. With all the American dredging records between these two regions it seems strange that none should record this species. Numerous lots of *Caduli* from the Hatteras region, so identified in the museum collection, upon more critical examination appear to be *C. agassizii* and *C. rushii.*

This well-marked species is at once recognizable by its peculiar apical characters and by the crooked or "dog tooth" shape, as of *C. vulpidens*, an appearance given by the slight obliquity of the equator. It is one of the very abundant species in the regions occupied.

The following are the lots in the National Museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	38644	Marthas Vineyard, U. S. B. F. Station 876	120 fms., 53°, sft. stk. m. (type lot).
1	38643	Marthas Vineyard, U. S. B. F. Station 874	85 fms., 51°, sft. stk. m. (figured 1896).
1	38641	Marthas Vineyard, U. S. B. F. Station 871	115 fms., 49° (figured 1896).
6	93147	Off Newport, Rhode Island, U. S. B. F. Station 871.	115 fms., 49° (typical) m. s.
6	314732	Marthas Vineyard, U. S. B. F. Station 876	120 fms., 53°, sft. stk. m.
16	38640	Marthas Vineyard, U. S. B. F. Station 870	155 fms., m. fne. s.
1	50996	Marthas Vineyard, U. S. B. F. Station 2539	133 fms., 48°, gn. s.
6	50997	Marthas Vineyard, U. S. B. F. Station 2555	136 fms., 48°, gn. m. s.
2	38639	Marthas Vineyard, U. S. B. F. Station 869	192 fms., 50°, fne. s.
1	38661	Marthas Vineyard, U. S. B. F. Station 1142	322 fms., 41°, m. s. p.
5	38641	Marthas Vineyard, U. S. B. F. Station 871	115 fms., 49°, m. fne. s.
6	38642	Marthas Vineyard, U. S. B. F. Station 873	100 fms., 51°, sft. stk. m.
25	38644	Marthas Vineyard, U. S. B. F. Station 876	120 fms., 53°, sft. stk. m.
11	38645	Marthas Vineyard, U. S. B. F. Station 877	126 fms., 57°, sft. stk. m.
1	38651	Marthas Vineyard, U. S. B. F. Station 945	207 fms., 44° gn. m. s.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
2	53091	Marthas Vineyard, U. S. B. F. Station 2590	190 fms., 47° g. m. s.
1	38662	Marthas Vineyard, U. S. B. F. Station 1144	386 fms., 41° sft. m.
9	38659	Marthas Vineyard, U. S. B. F. Station 1095	321 fms., 40°, sft. gn. m.
2	38643	Marthas Vineyard, U. S. B. F. Station 874	85 fms., 51°, sft. stk. m.
3	38663	Marthas Vineyard, U. S. F. B. Station 1154	193 fms., s. m.
4	38650	Off Marthas Vineyard, U. S. B. F. Station 943	157 fms., 49°, m. s. sh.
2	53067	Off Marthas Vineyard, U. S. B. F. Station 2582	137 fms., 47°, gn. m.
4	103441	Off Marthas Vineyard, U. S. B. F. Station 2583	137 fms., 47.5°, gn. m. s.
2	221641	Off Marthas Vineyard, U. S. B. F. Station 2541	134 fms., 48°, gn. s. sh.
4	314733	Miami, Florida, *Eolis* Station 312	25 fms.
1	314734	Off Key West, Florida, *Eolis* Station 333	110 fms.
6	314735	Fowey, Florida, *Eolis* Station 364	75–90 fms.
25	314736	Fowey, Florida, *Eolis* Station 371	110 fms.
108	314737	Fowey, Florida, *Eolis* Station 372	100 fms.
47	314738	Fowey, Florida, *Eolis* Station 359	100 fms.
195	314739	Fowey, Florida, *Eolis* Station 358	125 fms.
4	314740	Miami, Florida, *Eolis* Station 115	100 fms.
5	314741	Off Fowey Light, Florida, *Eolis* Station 306	100 fms.
3	314742	Off Fowey Light, Florida, *Eolis* Station 352	90 fms.
18	314743	Off Fowey Light, Florida, *Eolis* Station 305	110 fms.
2	314744	Miami, Florida, *Eolis* Station 95	90 fms.
4	314745	Off Ragged Key, Florida, *Eolis* Station 193	80 fms.
13	314746	Off Fowey Light, Florida, *Eolis* Station 303	135 fms.
40	314747	Off Fowey Light, Florida, *Eolis* Station 347	120 fms.
16	330522	Off Cape Florida, U. S. B. F. Station 2644	193 fms., 43.4°, g. s.
69	314748	Ragged Key, Florida, *Eolis* Station 339	100 fms.
116	314749	Fowey Light, Florida, *Eolis* Station 351	90 fms.
45	314750	Miami, off Government Cut, *Eolis* Station 310	118 fms.
101	314751	Fowey Light, Florida, *Eolis* Station 346	130 fms.
15	314752	Fowey Light, Florida, *Eolis* Station 349	100–150 fms.
43	314753	Fowey Light, Florida, *Eolis* Station 348	110 fms.
4	314754	Fowey Light, Florida, *Eolis* Station 374	85 fms.
2	314755	Caesars Creek, Florida, *Eolis* Station 376	90 fms.
33	314756	Fowey Light, Florida, *Eolis* Station 340	209 fms.
1	314757	Ragged Key, Florida, *Eolis* Station 194	85 fms.
24	314758	Fowey, Florida, *Eolis* Station 381	125 fms.
14	314759	Fowey, Florida, *Eolis* Station 377	190 fms.
6	314760	Fowey Light, Florida, *Eolis* Station 304	120 fms.
16	314761	Fowey, Florida, *Eolis* Station 378	165 fms.
2	82968	Fowey, Florida	150–200 fms. (Dr. Rush).
71	314762	Fowey, Florida, *Eolis* Station 379	140 fms.
32	314763	Fowey, Florida, *Eolis* Station 380	130 fms.
1	314764	Fowey Light, Florida, *Eolis* Station 353	85 fms.
2	314765	Fowey Light, Florida, *Eolis* Station 354	80 fms.
1	314766	East of Cape Florida, *Eolis* Station 189	67 fms.
1	97177	Five miles off Cape Florida, U. S. B. F. Station 2646.	85 fms., gn. s. form.

CADULUS (PLATYSCHIDES) WATSONI Dall.

Plate 18, fig. 12.

1881. *Cadulus watsoni* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 34.
1889. *Cadulus watsoni* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 429, pl. 27, fig. 12*a*.
1898. *Cadulus* (*Gadila*) *watsoni*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 167, pl. 25, fig. 50.

The shell is slightly curved, the curvature being confined mostly to its posterior portion. The convex outline describes a regular arch with but little modification at the equator. The concave outline is strongly arched posteriorly and straight for its remaining two-thirds length, with a noticeable bulge at the equator. There is, however, no localized swelling. The section of maximum diameter is at about the anterior third, from which point to the larger aperture the convex surface of the shell is decidedly flattened. The anterior aperture is oblique and considerably compressed. The entire shell is somewhat compressed except at the posterior end. The apical characters which are very indistinct in the type, but are plainer in some other National Museum specimens, clearly appear to belong to a *Platyschides* type, as shown in *C. pandionis*; that is, two "chipped out" notches, dorsal and ventral, leaving two lateral lobes low and ill defined.

Measurements are:

Length, 13 mm.; maximum diameter, 2.9 mm.; minimum diameter, 2.25 mm.; anterior aperture, 1.5 mm.; apical aperture, 0.6 mm. (type).

Length, 14.3 mm.; diameter, 2 by 2.25 mm.; anterior aperture, 1 by 1.25 mm.; apical aperture, 0.6 mm. (Old Providence.)

The type is in the Museum of Comparative Zoology collection, Cat. No. 7742, collected by the *Blake* off Cape San Antonio, Cuba, in 413 fathoms.

The only museum lot consists of five specimens, Cat. No. 94054, U.S.N.M., collected at the U. S. B. F. Station 2150, off Old Providence Island in 382 fathoms, bottom of white coarse sand, temperature 45.75° F.

This *Cadulus* is one of the *agassizii*, *rushii*, *pandionis* group, but is larger than any of those species. It is very highly polished and likely belongs to the deeper Antillean continental slope zone.

CADULUS (PLATYSCHIDES) VULPIDENS Watson.

Plate 18, fig. 8.

1879. *Cadulus vulpidens* Watson, Journ. Linn. Soc. London, vol. 14, p. 524.
1885. *Cadulus vulpidens* Watson, *Challenger* Rep. (Scaphopoda), p. 18, pl. 3, fig. 2.
1898. *Cadulus* (*Gadila*) *vulpidens*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 172, pl. 25, fig. 51.

The shell resembles the canine tooth of a carnivore, long, sharp, bent; obliquely swollen, the equator on convex side is at the anterior fourth and on the concave side at about the anterior third. The shell contracts more rapidly from equator to mouth. The curvature is greatest near the apical end. The aperture is oblique, its peristome sharp. The apical orifice is round, the edge "slightly gnawed," projecting a little on the convex curved side. Measurements are:

Length, 8.75 mm.; diameter, 1.79 mm.; anterior aperture, 0.9 mm.; apical aperture, 0.75 mm. (Watson).

The type is in the British Museum and was dredged by the *Challenger* off Culebra Island in 390 fathoms.

I have seen no authentic specimens. None of the lots in the National Museum collection tentatively assigned to this species seems quite to agree with Watson's figure or description. The oblique character of the equator is seeming rather than actual: this is caused by the obliqueness of the aperture. Neither is the shell actually "bent," but only appears to be so by reason of the obtusely angled equator, which is more prominently noticeable on the convex side.

CADULUS (PLATYSCHIDES) PROVIDENSIS, new species.

Plate 18, fig. 14.

The shell is moderately curved, rather slender and markedly swollen at about the anterior two-fifths, especially on the convex side, and has an obtusely angled equator. It is very little compressed. The aperture is very oblique, with rounded peristome. The convex outline forms an even arc to the equator, thence becomes a straighter line along a somewhat flattened surface to the anterior aperture. The concave side shows its chief curvature in the posterior one-fourth, with an almost straight outline the balance of the way, though bulged out somewhat at the equator. The lateral sides converge to the rather broad apical end and to the broader aperture at about the same angle. Details of the apical characters are not plain, but the convex side of the rim projects slightly in an obtusely angled lobe, while the opposite side tends to flare out, the lateral portions being broadly notched.

The type, Cat. No. 94055, U.S.N.M., measures—length, 8.5 mm.; diameter, 1.80 by 1.50 mm.; anterior aperture, 1 mm.; apical aperture, 0.6 mm. It was dredged at the U. S. B. F. Station 2150, off Old Providence Island, in 382 fathoms, bottom of white coarse sand, temperature 45.75° F., from a lot of three specimens.

Another lot of 14 specimens, Cat. No. 108176, U.S.N.M., is from the U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, sand, 46.3° F. None of these specimens is good, but they seem to be referable to *Cadulus providensis*.

This species probably differs but slightly from Watson's *vulpidens*, taken by the *Challenger* in 390 fathoms, off Culebra. The chief difference lies in the position of the equator, which in the form here described is more nearly central. They both belong to the same group of "wolf-tooth" species, a bent appearance caused by the obliquity of the aperture and the obtusely angular equator. It is larger than either *Cadulus amiantus* or *C. bushii*.

The following four species may be grouped together upon the common features of extreme length and slenderness with a markedly anterior position of the equator: *C. elongatus*, *C. greenlawi*, *C. arctus*, and *C. braziliensis*.

CADULUS (PLATYSCHIDES?) ELONGATUS, new species.

Plate 19, fig. 15.

The shell is exceedingly long and slender, slowly tapering from a very small apical orifice to the equator, which is placed at about the anterior one-fifth, and unmarked by local swelling. The convex outline is regularly curved to the equator, thence is almost straight to the anterior aperture. The concave outline is regularly curved in the posterior half, but almost straight anteriorly with a just perceptible convexity at the equator. The lateral outlines are almost straight, diverging but slowly from the very small apex through the long "neck" of the shell to its section of maximum diameter, thence converging slowly through the short remaining distance to the larger aperture. On the convex side the shell is much flattened between the equator and the very oblique aperture, causing its peristome to describe an irregular oval. Throughout, the shell is somewhat compressed, even the apical orifice showing a slightly flattened circle. Apical characters are not clearly shown, but a slight flare of the rim with certain irregularities indicate a probable *Platyschides* affiliation.

The type, Cat. No. 323596, U.S.N.M., measures—length, 14.10 mm.; diameter, 1.50 by 1.75 mm.; anterior aperture, 1.40 by 1 mm.; apical aperture, 0.4 mm. It was dredged at the U. S. B. F. Station 2378, off the mouth of the Mississippi River, in 68 fathoms, bottom of gray mud. It is a unique specimen.

This species is easily recognizable by its extreme length and slenderness. At first glance it might be associated with *Cadulus acus* but it belongs rather to the group of *C. arctus* and *C. braziliensis.* The shell is curiously marked by broken circles of opaque ivory white alternating with translucent ones. I do not, however, believe this to be a specific character. This same feature may be noted in *C. braziliensis.*

CADULUS (PLATYSCHIDES) GREENLAWI, new species.

Plate 18, fig. 11.

The shell is rather strongly curved, elongate, very slender, gradually increasing from a very small apical orifice to the equator, which is located at about the anterior one-third; thence the caliber of the shell rather suddenly contracts and then more slowly diminishes to the anterior aperture. The entire shell is somewhat compressed except near the apical end, where the section is round. The convex outline describes an even curve, though a little straightened from the equator to the larger aperture. The concave outline is more strongly arched posteriorly and is slightly bulged out at the equator. From the equator anteriorly the cylinder is decidedly flattened, imparting to the anterior aperture a transversely oval shape. The swelling at the equator is localized by reason of the contraction adjoining it anteriorly. The apical features are not clearly shown.

The type, Cat. No. 314767, U.S.N.M., measures—length, 11 mm.; diameter, 1 by 1.25 mm.; anterior aperture, 1 mm.; apical aperture, 0.25 mm. It was dredged by the *Eolis* at its Station 380, off Fowey Light, Florida, in 130 fathoms, bottom of green mud. The type is the only specimen.

Unfortunately the aperture of the unique specimen is injured and can not be described, but there is no reason to suppose it to be different from others of the group so far observed. Although the equator is less anteriorly placed, this species belongs to the group of *Cadulus elongatus*. It is named after Capt. S. W. Greenlaw, master of the *Eolis*. Both this species and *C. elongatus* are greatly lengthened and very slender forms of a conventional type of *Cadulus*, and are not to be associated with the rather bizarre group that includes *C. acus* and *C. dominguensis*.

CADULUS (PLATYSCHIDES) ARCTUS, new species.

Plate 19, fig. 19.

The shell is exceedingly slender, very slightly flattened, moderately curved, slightly swollen, with a very small apical orifice and a small contracted oblique anterior aperture. The equator is at the anterior fourth and represents the point of maximum section rather than a local swelling. The convex side has an evenly arched outline almost unmodified at the equator although the cylinder is flattened on this side from the equator to the larger aperture. The concave side is more strongly curved posteriorly and shows a slight bulge at the equator; its posterior three-fourths tapers to an attenuated apical opening. The anterior aperture is transversely oval, with a rather sharp peristome. The apical orifice is almost round. The apical characters are not clearly shown in any of the Museum specimens. Measurements are:

Length, 11 mm.; diameter, 1.60 by 1.40 mm.; anterior aperture, 1 mm.; apical aperture, 0.40 mm. (type).

Length, 9 mm.; diameter, 1.50 by 1.20 mm.; anterior aperture, 0.90 mm.; apical aperture, 0.40 mm.

The type, Cat. No. 323955, U.S.N.M., was taken at the U. S. B. F. Station 2404 in the Gulf of Mexico, off Cape San Blas, Florida, in 60 fathoms, bottom of gray sand.

There are 10 specimens in this and one other lot, Cat. No. 151830, from the same station. This is a unique record.

Cadulus arctus is one of the most gracefully formed species of the genus. Its extreme slenderness and finely drawn out apical portion make it quickly recognizable among all other *Caduli* from the same region.

CADULUS (PLATYSCHIDES) BRAZILIENSIS, new species.

Plate 19, fig. 16.

The shell is elongate, slender, round, slightly curved, with its section of maximum diameter at about the anterior one-fifth, and is unmarked by any local swelling. The convex outline describes a regular arch, though slightly straightened between the equator and the anterior aperture, which area is a little flattened. The concave outline forms almost a curve, though rather straighter in its anterior half, and with no convexity or even interruption at the equator.

The lateral lines diverge slowly from a narrow small apical orifice to the equator, the exact position of which, when viewed on the concave side, is rather indefinite, and thence they converge more rapidly to the relatively broad anterior aperture. This aperture is considerably flattened on its convex side, giving to it an irregularly oval outline; it is also very oblique. The apical characters are not clearly shown, but seem not to be perfectly simple.

The type, Cat. No. 96113, U.S.N.M., measures—length, 8.50 mm.; diameter, 1.10 to 1.20 mm.; anterior aperture, 0.8 by 1 mm.; apical aperture, 0.35 mm. It was dredged by the *Albatross* at the U. S. B. F. Station 2762, east of Rio de Janeiro, in 59 fathoms, bottom of mud, temperature 57°, and is from a lot of two specimens.

One specimen exhibits a series of opaque white rings alternated by translucent spaces like zebra stripes. The type shows the same conditions in a modified degree. This species belongs in a group with *Cadulus arctus* and *C. elongatus* and those other species characterized by a slight expansion of the diameter at an anteriorly placed equator. From this group must be excluded, of course, those species of similar shape, but which fall under *Polyschides* by reason of their special apical characters.

The remaining species of *Platyschides* are not easily grouped, though each possesses some characters similar to those of one or another of the groups heretofore considered; these are *Cadulus bushii*, *C. lunula*, *C. simpsoni*, *C. miamiensis*, *C. amiantus*, and *C. nitidus*.

CADULUS (PLATYSCHIDES) BUSHII Dall.

Plate 19, fig. 10.

1889. *Cadulus carolinensis bushii* DALL, Bull. Mus. Comp. Zool., vol. 17, p. 430.

1898. *Cadulus* (*Polyschides*) *carolinensis bushii*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 153, pl. 33, figs. 58, 59.

1901. *Cadulus* (*Polyschides*) *carolinensis bushii* DALL and SIMPSON, Bull. U. S. Fish Com. for 1900, vol. 1, p. 457.

The shell is small, thin, moderately curved, with a small apical orifice, rather quickly expanding to the point of maximum diameter, situated at about the anterior third, thence narrowing to a somewhat constricted oblique anterior aperture. The convex side describes an almost uniform arc, save for a very slight bulge at the equator; the concave side shows its greatest curvature in its posterior third; thereafter it is almost straight but with a well marked convexity at the equator. There is a constriction just back of the larger aperture, which is quite oblique and with a rounded peristome. The cylinder is considerably compressed, causing the apical orifice to be somewhat oval, though the anterior aperture is round. Viewed ventrally, the lateral sides taper evenly from a wide equator posteriorly to the small apex and anteriorly to the larger aperture. The apical features are not clear in the type. Measurements are:

Length, 6.5 mm.; diameter, 1.25 mm. (Dall).

Length, 7 mm.; diameter, 1.10 by 1.30 mm.; anterior aperture, 0.75 mm.; apical aperture, 0.4 mm. (Barbados).

The type, Cat. No. 95376, U.S.N.M., is from Barbados, taken in 100 fathoms.

The distinguishing feature of this little shell is the decided dorso-ventral compression which separates it at once from its nearest relatives—*Cadulus lunula* and *C. simpsoni*.

The following additional lots in the National Museum collection are all from the dredgings of the State University of Iowa Expedition to Barbados in 1918.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
3	314925	Barbados, S. U. I. Exp. Station 88	— fms.
4	314926	Barbados, S. U. I. Exp. Station 3	75–80 fms.
3	314927	Barbados, S. U. I. Exp. Station 51	35 fms.
5	314928	Barbados, S. U. I. Exp. Station 40	90 fms.
2	314929	Barbados, S. U. I. Exp. Station 69	60–70 fms.
3	314930	Barbados, S. U. I. Exp. Station 48	80 fms.
4	314931	Barbados, S. U. I. Exp. Station —	— fms.
1	95376	Barbados (*Blake* collection)	100 fms.

CADULUS (PLATYSCHIDES) LUNULA Dall.

Plate 19, fig. 12.

1881. *Cadulus lunulus* Dall, Bull. Mus. Comp. Zool., vol. 9, p. 35.

1889. *Cadulus lunula* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 431, pl. 27, fig. 8, in part.

1889. *Cadulus lunula* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 8, in part.

1898. *Cadulus* (*Gadila*) *lunula*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 167, pl. 25, fig. 55, omitting Cape Lookout reference.

1903. *Cadulus lunula* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 8, in part.

Doctor Dall's type is a broken specimen, leaving both the diagnosis and the figure necessarily incomplete. I have hesitated to refer any National Museum specimens to the species, as the type fragment may be liberally interpreted to fit several of the smaller Antillean *Caduli*. However, a single specimen from Barbados in the museum collection seems to be referable with certainty to the species, despite the difference in depth station. The steepness of the continental shelf off northwest Cuba and the swiftness of the oceanic current that sweeps by it may account for the finding of a dead fragment at depths in excess of that of the natural habitat of the species. The supplemental description here given follows as closely as possible the original one, the additions being bracketed.

The shell is translucent [semitransparent], white, smooth, destitute of sculpture; dorsum (that is the concave outline) is nearly straight [except for a gentle arch in the posterior portion], slightly inflated [at the equator, which is located at about the anterior third; the convex side describes an uninterrupted arch]. The aperture is contracted and not flattened [except slightly laterally and is oblique]. [There is no local swelling or gibbosity at the equator, nor is the shell compressed unless very slightly so laterally.] The apical characters are not clear, but indicate indistinctly two lateral chipped but rounded notches, leaving bluntly pointed lobes on the convex and concave sides.

The type is in the Museum of Comparative Zoology collection, Cat. No. 7747, and measures—length, "6" mm.; diameter, 1.5 mm.; anterior aperture, 0.75 mm.; apical aperture, "0.87" mm. It was taken at United States Coast Survey Station 2, off Habana, Cuba, in 805 fathoms, bottom temperature 39.75° F.

This little *Cadulus* is easily distinguished from *C. bushii* by its lack of dorso-ventral compression and from all others by its slight lateral compression. The shell is more inflated than are any of the other species of similar length.

In the National Museum collection is a single specimen, Cat. No. 314940, U.S.N.M., dredged by the State University of Iowa, 1918, at their station 79, off Pelican Island, Barbados, in 70 fathoms.

CADULUS (PLATYSCHIDES) SIMPSONI, new species.

Plate 19, fig. 17.

1901. *Cadulus carolinensis bushii* Dall and Simpson, Bull. U. S. Fish Comm. for 1900, vol. 1, p. 457 (not of Dall, 1889).

The shell is small, slender, slightly curved, with its equator at about the anterior two-fifths or almost median and with no local swelling or bulbous appearance. The convex side presents a regular arch, even and unbroken; the concave side is almost a straight line except for some curvature at the posterior end and a slight convexity at the equator. The anterior aperture is a little contracted and laterally compressed, and is also quite oblique; the apical orifice is round; the shell is not conspicuously compressed or flattened, but is a trifle so laterally in its anterior portion. The apical characters are too indistinct for definite description, but are probably of the *Platyschides* type.

The type, Cat. No. 161580 (*a*), U.S.N.M., was taken at the U. S. B. F. Station 6062, Mayaguez roadstead, Porto Rico, in 25 fathoms, bottom of sand, mud, and shells, temperature 75.8° F., from a lot of 29 specimens. It measures—length, 7.5 mm.; diameter, 1.3 by 1.25 mm.; anterior aperture, 0.7 mm.; apical aperture, 0.4 mm.

In the National Museum collection are also a lot of six specimens, Cat. No. 314677, U.S.N.M., Ensenada de Cochinos, Cuba, 100 to 150 fathoms, from *Eolis* Station 232; a lot of four specimens, Cat. No. 314932, U.S.N.M., collected at the State University of Iowa Station 115, off English Harbor, Antigua, in 120 fathoms.

In that the shell of this species is slightly compressed laterally, its position is next to *Cadulus lunula.* It has a slightly larger shell than *C. bushii* and is again distinguishable from that species by its lateral compression—*bushii* having a very noticeable dorso-ventral compression. It is named for Mr. Charles T. Simpson, the joint author with Doctor Dall in the report upon the Porto Rican mollusks, referred to above.

CADULUS (PLATYSCHIDES) AMIANTUS Dall.

Plate 19, fig. 8.

1881. *Cadulus sauridens*, Dall, Bull. Mus. Comp. Zool., vol. 9, p. 36 (not of Watson, 1879).
1889. *Cadulus amiantus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 431, pl. 27, fig. 7, in part.
1889. *Cadulus amiantus* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 7, in part.
1898. *Cadulus* (*Gadila*) *amiantus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 174, pl. 25, fig. 52, in part.
1903. *Cadulus amiantus* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 7, in part. (Not *C. amiantus*, Dall and Simpson, in Bull. U. S. Fish Commission for 1900, p. 457.)

The type of this species is a young and somewhat defective specimen that will not admit of the careful description these difficult little shells require. The only description given is a comparison of the shell with Doctor Watson's *Cadulus sauridens* and *C. vulpidens*, neither of which species do we know in this country save by the original descriptions. A careful comparison of the type with all the western Atlantic species of the group has resulted only in doubt and confusion owing to the imperfections of the type itself. The shell is smaller than any of the group except *C. nitidus*, which is more slender. Its nearest ally is *C. miamiensis*, which in turn is somewhat larger. The following supplemental diagnosis is given from the type of *C. amiantus:*

The shell is small, moderately curved, slender, with its section of maximum diameter about two-fifths distance from the anterior end; this does not amount to a local swelling, nor is the equator angled. The convex side presents an even uninterrupted arc, of which the anterior portion is somewhat flattened. The concave side has its greatest arc in the posterior third, its anterior half being almost straight with a slight convexity opposite the equator. From the equator on the convex side to the anterior aperture the cylinder is flattened very perceptibly, the balance of the shell being round. The larger aperture is oblique. The apical orifice is round and is neither very large or very small. The apical features show some modification from a simple rim, but no clear diagnosis can be made.

The type is in the collection of the Museum of Comparative Zoology, Cat. No. 7749, and measures—length, 5.75 mm.; diameter, 1.04 mm.

("1.4"). It was dredged by the *Blake* at the United States Coast Survey Station 19, off Bahia Honda, Cuba, in 310 fathoms, bottom temperature 52.25° F.

There are no examples in the museum collection.

CADULUS (PLATYSCHIDES) NITIDUS, new species.

Plate 19, fig. 9.

1901. *Cadulus amiantus* Dall and Simpson, U. S. Fish Comm. Bulletin for 1900, vol. 1, p. 457.

The shell is very moderately curved, slender, with its section of greatest diameter at about the oral third. There being no local swelling or bulging, the exact position of the equator is not clearly marked. The convex side shows an even uninterrupted arc. The concave side is almost a straight line with some slight curvature at the posterior end and with scarcely any convexity at the equator. The shell is round in section, there being no flattening at any point; viewed ventrally, the lateral lines converge but gradually from the narrow equator to a rather large apical orifice and to a relatively small anterior aperture. The last is but slightly oblique. The apical characters are very distinct, showing four shallow but well-marked notches separating as many lobes, the dorsal and ventral ones being the widest. Within the apical orifice is an opaque ring, though this may not always be present.

The type, Cat. No. 161582, (*a*), U.S.N.M., measures—length, 5.75 mm.; diameter, 0.9 mm.; anterior aperture, 0.75 mm.; apical aperture, 0.5 mm. It was collected at the U. S. B. F. Station 6062, in Mayaguez Harbor, Porto Rico, in 25 fathoms, bottom of sand, mud, and shells; temperature, 75.8° F. It is selected from a lot of 40 specimens.

These shells were originally identified as *C. amiantus,* but comparison with the type obliges me to remove them. They are smaller and more slender than are any other species placed near them in this review; these specimens show the apical features with the perfect definiteness of some species of *Polyschides*. *C. nitidus* is smaller than *C. portoricensis,* but otherwise very closely related.

CADULUS (PLATYSCHIDES) MIAMIENSIS, new species.

Plate 19, fig. 18.

The shell is rather strongly curved; the convex outline describes a fairly even arch, though flattened in its anterior portion between the aperture and the equator. The concave outline is more arched posteriorly though it is not quite a straight line from the equator to the aperture. The maximum diameter is about two-fifths distance from the anterior aperture. There is no local bulge nor swelling nor any trace of carination at the equator. The anterior portion of the shell is somewhat flattened on its convex side. The larger aperture is very oblique. The shell is semitransparent with many inner translucent rings of shelly deposit especially in the posterior end, or "neck." The apical characters show some modification from a mere simple rim but they are not distinct.

There is very little variation in size.

The type, Cat. No. 314772 (*a*), U.S.N.M., measures—length, 7.75 mm.; diameter, 1.5 mm.; anterior aperture, 1 mm.; apical aperture, 0.5 mm. It was dredged at *Eolis* Station 340, off Fowey Light, Florida, in 209 fathoms, bottom of fine sand.

This seems to be an abundant species of the Floridian upper continental shelf zone within the Gulf Stream area. It strongly resembles *Cadulus amiantus* but is larger. It is much larger than *C. nitidus*, less inflated than *C. lunula*, and lacks the lateral compression of *C. lunula* and *C. simpsoni* and the dorso-ventral compression of *C. bushii*.

The following are the museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
5	108176a	Charleston, North Carolina, U. S. B. F. Station 2668.	294 fms., 46.3°, gy. s. dd. co.
2	314769	Fowey Light, Florida, *Eolis* Station 303	135 fms.
1	314770	Fowey Light, Florida, *Eolis* Station 304	120 fms.
1	314771	Fowey Light, Florida, *Eolis* Station 306	100 fms.
25	314772	Fowey Light, Florida, *Eolis* Station 340	209 fms. (type).
16	314773	Fowey Light, Florida, *Eolis* Station 347	120 fms.
15	314774	Fowey Light, Florida, *Eolis* Station 348	110 fms.
4	314775	Fowey Light, Florida, *Eolis* Station 371	110 fms.
2	314776	Fowey Light, Florida, *Eolis* Station 353	85 fms.
10	314777	Fowey Light, Florida, *Eolis* Station 377	190 fms.
6	314778	Fowey Light, Florida, *Eolis* Station 378	165 fms.
1	314779	Fowey Light, Florida, *Eolis* Station 379	140 fms.
3	314780	Fowey Light, Florida, *Eolis* Station 381	125 fms.
9	314781		
2	330522	Cape Florida, Florida, U. S. B. F. Station 2644	193 fms., gn. s.

Subgenus GADILA Gray, 1847.

1847. *Gadila* Gray, Proc. Zool. Soc., p. 159. For full synonymy and discussion thereon see Pilsbry and Sharp in Tryon's Manual of Conchology, vol. 17, p. 162.

These authors first defined the subgenus by description, as follows:

> Shell decidedly curved; more or less swollen near the middle or toward the aperture; more tapering toward the apex; apical orifice not contracted by a callous ring; or, with such callous ring, weak and far within. Edges not slit. (Pilsbry and Sharp.)

The type is *Cadulus gadus* Montague.

The essential characters of *Gadila* are first, the simple rim of the apical orifice unmodified by any slits or lobes and second, the slenderness of the shells. This second feature is of less importance for there can be no strict division made between the more inflated forms of *Gadila* and the less obese forms of *Cadulus*, s. s.

Pilsbry and Sharp in their monograph just referred to placed under *Gadila* many species with shells having less distinct apical characters than the shells of *Polyschides*, to include which I have proposed the subgenus *Platyschides*.

By removal, then, from this subgenus to *Platyschides* of all those species with shells having shallow apical notches and lobes, the American representatives of *Gadila* are now reduced to a few species of small and even minute shells. These fall within four recognizable groups:

1. Those having shells of a "bent" or "canine tooth" appearance owing to a slightly carinated equator and an oblique anterior aperture.

2. Those with small and even very small shells, having a median equator.

3. Those of uniform diameter throughout, with orifices of equal diameter.

4. Those with exceedingly slender, needle-like shells having the equator just back of the anterior aperture.

The dividing line between *Gadila* and *Platyschides* is often made obscure by the obliteration of apical characters through injury to the thin and fragile rim of the apical orifice. Were these subgenera based, however, upon any very solid foundation of biological characters their importance might demand a greater care in the referring of species to a fixed and exact place under them.

The species grouped under 1. are *Cadulus sauridens*, *C. rastridens*, and *C. mayori*.

CADULUS (GADILA) SAURIDENS Watson.

Plate 19, fig. 11.

1879. *Cadulus sauridens* Watson, Journ. Linn. Soc. London, vol. 14, p. 525.

1885. *Cadulus sauridens* Watson, *Challenger* Report (*Scaphopoda*) p. 19, pl. 3, fig. 4.

1898. *Cadulus* (*Gadila*) *sauridens*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 173, pl. 25, fig. 56.

The shell is small and narrow, slightly compressed, a little bent, with the equator about median, showing a swelling on the convex side. The convex side describes an even arc. The concave side has its greatest curvature posteriorly; elsewhere it is almost straight with a slight convexity at the equator. The anterior aperture is small, very oblique, and the peristome is thin. There are "very faint microscopical traces of longitudinal texture." The apical features are "chipped." Measurements are:

Length, 3 mm.; diameter, 0.5 mm.; anterior aperture, 0.25 mm.; apical aperture, 0.23 mm. (Watson).

The type is in the British Museum, and was dredged at the *Challenger* Station 24, off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

Watson's mention of a "chipped" apical rim makes doubtful the position of the species under *Gadila*.

It is less swollen than *Cadulus rastridens*. The swelling is more median and without the bluntly angulated equator of the latter.

The mention of a longitudinal sculpture does not set this apart from other species of *Cadulus*, for the suggestion of a shadow of sculpture when viewed in oblique light, may be detected in some specimens of all species, particularly if the imagination be as carefully focussed as the microscope.

I am unable to refer with satisfying assurance any shells in the Museum collection to this very conventionally shaped little *Cadulus*.

CADULUS (GADILA) RASTRIDENS Watson.

Plate 19, fig. 1.

1879. *Cadulus rastridens* Watson, Journ. Linn. Soc. London, vol. 14, p. 525.

1885. *Cadulus rastridens* Watson, *Challenger* Report (*Scaphopoda*), p. 19, pl. 3, fig. 3.

1898. *Cadulus* (*Gadila*) *rastridens*, Pilsbry and Sharp, Tryon's Man. Conch. vol. 16, p. 174, pl. 25, fig. 62.

The shell is very small, slightly compressed, narrow, "bent," with a swelling at about the anterior three-eighths which is faintly keeled at the equator. The anterior aperture is not oblique and is rather large. The convex side exhibits a rather straight outline from the apical end to the equator; thence, at an angle, again rather straight to the anterior aperture. The concave side describes a shallow arch with a very slight convexity at the equator. The apical orifice is relatively large and round. No apical features are mentioned besides the rim being "less chipped than the mouth (anterior aperture)." Measurements are:

Length, 3 mm.; diameter, 0.6 mm.; anterior aperture, 0.38 mm.; apical aperture, 0.25 mm. (Watson).

The type is in the British Museum, taken at *Challenger* Station 24, off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

In the museum collection are topotypes from author, Cat. No. 118774, U.S.N.M. Also a lot of four specimens, Cat. No. 108280, U.S.N.M., from the U. S. B. F. Station 2415, off Georgia, in 440 fathoms, bottom of sand, 45.6° F. Also a lot of 85 specimens, Cat. No. 108169, U.S.N.M., from the U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of gray sand and dead coral, temperature 46.3°; also 35 specimens, Cat. No. 108168, U.S.N.M., from the same station.

The "bent" appearance is the result of the break at the equator in the outline of the convex side, forming an angle between two rather straight lines. In most *Caduli* the outline of the convex side is more arched and the "break" is less apparent. The lack of obliqueness in the anterior aperture is striking.

CADULUS (GADILA) MAYORI, new species.

Plate 19, fig. 3.

The shell is very small, moderately curved, with its section of maximum diameter at about the anterior two-fifths and which is marked by a small bulbous swelling. In some specimens the equator is also marked by a very obtuse angle though not sufficiently prominent to impart to the shell that "dog-toothed" appearance so noticeable in the species of the *vulpidens* group. The convex outline is rather strongly arched, with a slight hump at the equator. The concave outline is not quite straight, there being two slightly concave areas before and after a decided convexity at the equator. The shell is not flattened. The anterior aperture is oblique with a rounded peristome. The apical orifice is about two-thirds as large, round, and usually has a callous ring or two within the opening. Apical features are apparently simple. Measurements are:

Length, 4 mm.; diameter, 0.9 mm.; anterior aperture, 0.55 mm.; apical aperture, 0.4 mm. (type).

Length, 3.7 mm.; diameter, 0.8 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.3 mm.

The type, Cat. No. 314783, U.S.N.M., was dredged at *Eolis* Station 33, east of Tortugas, in 16 fathoms, bottom of coral sand. The general shape and facies of this little *Cadulus* strongly suggests *Cadulus sauridens*, but it is persistently larger and seems to belong geographically more strictly to the Floridian region. It is probably of a somewhat lesser depth range.

The following lots are in the National Museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
1	314783	Tortugas, Florida, *Eolis* Station 33	16 fms. (type).
64	314784	do.	Do.
46	314785	Off Key West, Florida, *Eolis* Station 42	60 fms.
153	314786	Off Key West, Florida, *Eolis* Station 43	63 fms.
1	314787	Off Key West, Florida, *Eolis* Station 73	
42	314788	Miami, Florida, *Eolis* Station 48	60 fms., gn. m.
1	314789	Miami, Florida, *Eolis* Station 49	30 fms.
5	314790	Miami, Florida, *Eolis* Station 68	45 fms.
6	314791	Miami, Florida, *Eolis* Station 69	38 fms.
2	314792	Miami, Florida, *Eolis* Station 87	63 fms.
1	314793	Miami, Florida, *Eolis* Station 117	35–38 fms.
6	314794	Miami, Florida, *Eolis* Station 140	65 fms.
1	314795	Miami, Florida, *Eolis* Station 311	75 fms.
1	314796	Off Fowey Light, Florida, *Eolis* Station 128	60 fms.
2	314797	Off Fowey Light, Florida, *Eolis* Station 147	35 fms.
2	314798	Off Fowey Light, Florida, *Eolis* Station 152	40 fms.
2	314799	Off Fowey Light, Florida, *Eolis* Station 156	47 fms.
1	314800	Off Fowey Light, Florida, *Eolis* Station 167	65 fms.
1	314801	Fowey Light, Florida, *Eolis* Station 172	55 fms.
3	314802	Fowey Light, Florida, *Eolis* Station 179	70 fms.
2	314803	Fowey Light, Florida, *Eolis* Station 182	75 fms.
1	314804	Fowey Light, Florida, *Eolis* Station 186	68 fms.
1	314805	Fowey Light, Florida, *Eolis* Station 306	100 fms.
1	314806	Fowey Light, Florida, *Eolis* Station 354	80 fms.
3	314807	Fowey Light, Florida, *Eolis* Station 356	55 fms.
2	314808	Fowey Light, Florida, *Eolis* Station 360	100 fms.
3	314809	Fowey Light, Florida, *Eolis* Station 364	75–90 fms.
16	314810	Ajax Reef, Florida, *Eolis* Station 368	80–100 fms.

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
13	314811	Ajax Reef, Florida, *Eolis* Station 370	70-90 fms.
2	314812	Sambo Reef, Florida, *Eolis* Station 196	58 fms.
39	314813	Sand Key, Florida, *Eolis* Station 32	61 fms.
2	314814	Sand Key, Florida, *Eolis* Station 100	65 fms.
2	314815	Sand Key, Florida, *Eolis* Station 300	72 fms.
1	314816	Triumph Reef, Florida, *Eolis* Station 350	70-90 fms.
32	157809	Gulf of Mexico, U. S. F. C. Station 2404	60 fms., gy. s.
14	323953	Gulf of Mexico, off San Blas, Florida, U. S. F. C. Station 2404.	60 fms., gy. s.

The following six species fall within the Group 2, referred to under the description of the subgenus *Gadila;* they all have small or very small slender shells of median or submedian equator: *Cadulus minusculus*, *C. iota*, *C. subula*, *C. verrilli*, *C. regularis*, *C. atlanticus*.

CADULUS (GADILA) MINUSCULUS Dall.

Plate 19, fig. 4.

1889. *Cadulus minusculus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 432.
1889. *Cadulus minusculus* Dall, Bull. 37, U.S. Nat. Mus., p. 78.
1898. *Cadulus* (*Gadila*) *minusculus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 164, pl. 32, fig. 42, 43.
1903. *Cadulus minusculus* Dall, Bull. 37, U. S. Nat. Mus., p. 78.

The shell is very small, fusiform, slightly curved, with a moderate swelling at a median equator; the anterior aperture is oblique, with a rounded peristome; the apical orifice is round, and has an internal translucent ring, about half the diameter of the aperture. The cylinder is slightly compressed. The convex outline is rather strongly arched but the concave outline is nearly straight with a slight convexity at the equator. The lateral outlines are arcuate. No apical features observable. Measurements are:

Length, 2.33 mm.; diameter, 0.616 by 0.58 mm.; anterior aperture, 0.34 mm.; apical aperture, 0.3 mm. (Pilsbry.)

A very slight range in measurement is noted.

The type, Cat. No. 93122, U.S.N.M., was obtained at the U. S. B. F. Station 2595, off Cape Hatteras, in 63 fathoms, bottom of gray sand and broken shells.

The very small size of these tiny mollusks, permitting them to slip through the meshes of any but very fine sieves, probably accounts for the single record from a region of so many dredging stations.

CADULUS (GADILA) IOTA, new species.

Plate 19, fig. 2.

1901. *Cadulus minusculus*, Dall and Simpson, Bull. U. S. Fish Comm., vol. 1 for 1900, p. 457 (not *minusculus* Dall, 1889).

The shell is very minute and somewhat swollen in its middle portion. The convex outline is regularly arched; the concave outline is almost straight, with a slight convexity at a median equator and with a slight concavity near each end. The lateral outlines are rather straight, with an angle at the equator. The cylinder is hardly flattened. The anterior aperture is oblique; the apical orifice is round and of about half the diameter of the larger aperture, and carries a callous rib just within the opening. The apical features are not clearly defined, but are probably simple.

The type, Cat. No. 161581, U. S. N. M., measures—length, 2 mm.; diameter, 0.5 mm.; anterior aperture, 0.3 mm.; apical aperture, 0.15 mm. It was dredged at the U. S. B. F. Station 6062, in Mayaguez Harbor, Porto Rico, in 25 fathoms, bottom of sand, mud and shells, temperature 75.8° F.

In the National Museum collection are also the following lots: three specimens, Cat. No. 323014, U.S.N.M., taken at the U. S. B. F. Station 2315, off Key West, Fla., in 37 fathoms, bottom of coral; one specimen, Cat. No. 314817, U.S.N.M., taken at *Eolis* Station 68, off Miami, Florida, in 45 fathoms; one specimen, taken off the Lazaretto, Barbados, in 80 fathoms, by the Iowa State University Expedition at their station 86, seems quite typical, although the length is about 2.25 mm.

This little mite of a shell is the smallest of this group of very small forms, and is one of the smallest of all mollusks. Although its measurements in fractions of millimeters do not seem to warrant it, yet when laid side by side with *Cadulus minusculus* it seems to be hardly half as large.

CADULUS (GADILA) SUBULA, new species.

Plate 19, fig. 5.

The shell is very small, exceedingly slender, moderately curved, and very slightly compressed. Its equator is median and is slightly swollen. The cylinder is a little flattened on its convex side just back of the anterior aperture. The convex outline is regularly arched with a scarcely perceptible modification at the equator. The concave outline has a convexity at the point of maximum diameter and a slightly concave arc above and below. Viewed on the concave face the lateral outlines present two almost parallel lines, somewhat deflected apart at the equator. The anterior aperture is round, oblique, and has a rounded smooth peristome. The apical orifice is a little flattened into an oval shape; and is not much smaller than the other aperture.

The type, Cat. No. 323113, U.S.N.M., measures—length, 3.50 mm.; diameter, 0.5 mm.; anterior aperture, 0.35 mm.; apical aperture, 0.275 mm. It was dredged by the *Albatross* at the U. S. B. F. Station 2352, off Bahia Honda, Cuba, in 463 fathoms, bottom of white coral mud, temperature 45° F. It is selected from a unique lot of two specimens.

This is the slenderest species of the group. It is also characterized by its exceedingly small size, feeble swelling, and its very regular curvature.

CADULUS (GADILA) VERRILLI, new species.

Plate 19, fig. 13.

1880. *Cadulus propinquus*, VERRILL, Proc. U. S. Nat. Mus., vol. 3, p. 395 (not of Sars, 1878).
1880. *Cadulus propinquus*, VERRILL, Amer. Journ. Sci., vol. 20, p. 392.
1880. *Cadulus jeffreysii*, VERRILL, Amer. Journ. Sci., vol. 20, p. 392 (not of Monterosato, 1875).
1880. *Cadulus jeffreysii*, VERRILL, Proc. U. S. Nat. Mus., vol. 3, p. 395 (not of Monterosato, 1875).
1882. *Cadulus propinquus*, VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 5, p. 568, pl. 58, figs. 31, 32 (not of Sars, 1878).
1882. *Cadulus jeffreysii*, VERRILL, Trans. Conn. Acad. Arts and Sci., vol. 5, pt. 2, p. 559 (not of Monterosato, 1875).
1885. *Cadulus subfusiformis*, VERRILL, in Rept. of Com. of Fish and Fisheries for 1883, p. 573 (not of Sars, 1865).
1885. *Cadulus propinquus*, BUSH, in Rept. of Com. of Fish and Fisheries for 1883, p. 717 (not of Sars, 1878).
1885. *Cadulus jeffreysii*, BUSH, in Rept. of Com. of Fish and Fisheries for 1883, p. 717 (not of Monterosato, 1875).
1889. *Cadulus jeffreysii*, DALL, Bull. Mus. Comp. Zool., vol. 17, p. 430 (not of Monterosato, 1875).
1898. *Cadulus* (*Gadila*) *jeffreysi*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 16, p. 164, pl. 32, figs. 44–46, in part and not including pl. 24, fig. 39).
1903. *Cadulus jeffreysi*, DALL, Bull. 37, U. S. Nat. Mus., p. 76 (not of Monterosato, 1875).

The shell is very small, rather stout, with its greatest diameter about median and not marked by a local swelling, and with a large oblique anterior aperture having a rounded peristome. The apical orifice is three-fourths the size of the larger aperture and is somewhat constricted. The convex outline forms a regular arch, slightly flattened anteriorly and rendered slightly concave just back of the apical opening. The concave side is almost a straight line, with a slight convexity at the equator. The lateral outlines are quite straight as the shell is not flattened and the apertures are of so nearly equal size. No apical features are observable.

The type, Cat. No. 38963, U.S.N.M., measures—length, 2.75 mm.; diameter, 0.75 mm.; anterior aperture, .50 mm.; apical aperture, 0.4 mm. It was obtained at the U. S. B. F. Station 871, off Marthas Vineyard, in 115 fathoms, bottom of mud and fine sand, temperature 49° F.

A critical comparison of these little shells with the many specimens in the Jeffreys collection under the names given in the synonymy above convinces me of the propriety of separating them specifically. The many lots in that collection named *Cadulus jeffreysi* include two, if not three, seemingly distinct species, one of which, from northern stations, approximates very closely our species, but this is not the *C. jeffreysi* of Monterosato described from the Mediterranean. In relation to the other species of the group so far considered, this is relatively the stoutest and has the largest apical orifice.

The following lots are in the National Museum collection:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	38693	Off Marthas Vineyard, U. S. B. F. Station 871....	115 fms., m. s., 49°.
7	38693	.....do..	Do.
1	38694	Off Marthas Vineyard, U. S. B. F. Station 873...	100 fms., 51°, sft, stk. m.
5	61144	Off Marthas Vineyard, U. S. B. F. Station 871...	115 fms. 49°, m. fne. s.

[1] Type.

CADULUS (GADILA) REGULARIS, new species.

Plate 19, fig. 14.

The shell is small, with a median equator, without a local swelling, round section; the anterior aperture is oblique; the apical orifice is large, slightly flattened, but not constricted. The convex outline is rather strongly arched, though not evenly so, its posterior portion being straighter. The concave outline is almost a straight line, modified by a convexity at the equator and a gentle concavity in its anterior portion. The apical features are not distinct, but are probably simple.

The type, Cat. No. 330676 (*a*), U.S.N.M., measures—length, 4.25 mm.; diameter, 1.1 mm.; anterior aperture, 0.6 mm.; apical aperture, 0.5 mm. It is from the U. S. B. F. Station 2660, off Cape Canaveral, Florida, in 504 fathoms, bottom of yellow foraminifera, temperature 45.7° F. There is in the collection another lot of one specimen, Cat. No. 330675, U.S.N.M., from the same station; also a lot of 50 specimens, Cat. No. 108278, U.S.N.M., from the U. S. B. F. Station 2415, off Georgia in 440 fathoms, bottom of sand, temperature 45.6° F.; also a lot of 100 specimens, Cat. No. 108175, U.S.N.M., from the U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of sand, temperature 46.3° F.

The shell is stouter than *Cadulus atlanticus* and larger than *C. verrilli* and *C. transitorius*. It is not quite bulbous enough to be included under the subgenus *Cadulus*. In the many dredgings made along the upper part of the continental shelf of eastern Florida, between 100 and 200 fathoms, no specimens of this species have been taken.

CADULUS (GADILA) ATLANTICUS, new species.

Plate 20, fig. 2.

1885. *Cadulus jeffreysi*, (?) Verrill, in Rept. of Com. of Fish and Fisheries for 1883, p. 573 (not of Monterosato, 1875).

1889. *Cadulus gracilis*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 432 (not of Jeffreys, 1877).

1889. *Cadulus gracilis*, Dall, Bull. 37, U. S. Nat. Mus., p. 78 (not of Jeffreys, 1877).
1898. *Cadulus gracilis*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p.165. in part.
1903. *Cadulus gracilis*, Dall, Bull. 37, U. S. Nat. Mus., p. 78 (not of Jeffreys, 1877).

The shell is small, slender, slightly curved, little swollen, with its section of maximum diameter about median. The cylinder is round at the equator, but considerably flattened or compressed posteriorly. The convex outline describes a fairly even arc, which is slightly flattened anteriorly. The concave outline shows a decided concavity with a scarcely perceptible convexity at the equator. The anterior aperture is oblique, almost round, with its peristome rounded. The apical orifice is flattened into an oval section and is relatively large and a little flaring. There are one or more callous rings within it. The apical characters are not positively determinable, but carry a suspicion of *Platyschides* features. Measurements are:

Length, 4.90 mm.; diameter, 1 mm.; anterior aperture, 0.55 mm.; apical aperture, 0.5 by 0.4 mm. (Type.)

Length, 4.75 mm.; diameter, 0.9 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.5 by 0.4 mm.

The type, Cat. No. 78238, U.S.N.M., was obtained at the U. S. B. F. Station 2682, off Nantucket, in 1,004 fathoms, bottom of green mud and sand.

This is the largest species of the series of *Caduli* comprising this group of very small slender forms. It is again characterized by the very decided compression of the posterior fourth of the shell with the resulting oval apical orifice; also by the median equator, consisting of only a very slight expansion of the cylinder. Although Jeffreys himself compared a specimen from the 843-fathom lot (station 2115) with specimens of his own *C. gracilis* from British waters, and accepted their specific identity, I feel it necessary to separate these Eastern and Western Atlantic forms. The two species are undeniably closely related, belonging to the same group, but the English specimens are smaller, more slender, and their apical orifices are not usually so decidedly flattened. In the comparison of these very small *Caduli* one senses certain differences that may result from some very slight cause, as the degree of posterior curvature, or the degree of the anterior flattening, or the angle of obliqueness of the aperture, or the exact relation of maximum diameter to the total length. These differences, if they hold good throughout, seem sufficient grounds for separation of individuals taken from two sides of a great ocean, even though one may not be able to set forth clearly in words these shell differences.

The following are the National Museum records:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 4	78238	South of Nantucket, U. S. B. F. Station 2682	1004 fms., gn. m. s.
1	78240	Southeast of Nantucket, U. S. B. F. Station 2710.	984 fms., gn. m.
1	40477	South of Block Island, U. S. B. F. Station 2207	1061 fms., 38° gn. m.
10	35626	Off Cape Hatteras, U. S. B. F. Station 2115.	843 fms., m. s., 39°.
2	35720	Off Cape Hatteras, U. S. B. F. Station 2110.	516 fms., 40°, bu. m.
7	322542	Off Cape Hatteras, U. S. B. F. Station 2115.	843 fms., m. s., 39°.
1	35626	do	Do.
1	314818	Off Block Island, U. S. B. F. Station 2212	428 fms., gn. m.
1	314819	Off Delaware, U. S. B. F. Station 2234	810 fms., gn. m.

[1] Type.

The following species of unique character seems to stand alone among the *Caduli* of the Atlantic; it is the only one in Group 3 referred to in the consideration of the subgenus *Gadila*:

CADULUS (GADILA) CYLINDRATUS Jeffreys.

Plate 20, fig. 15.

1877. *Cadulus cylindratus* Jeffreys, Ann. Mag. Nat. Hist., ser. 4, vol. 19, p. 158.
1882. *Cadulus cylindratus* Jeffreys, Proc. Zool. Soc., p. 664, pl. 49, fig. 6.
1884. *Cadulus cylindratus*, Verrill, Trans. Conn. Acad. Arts and Sci., vol. 6, pt. 1, p. 220.
1898. *Cadulus* (*Gadila*) *cylindratus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 166, pl. 24, fig. 26.

Two lots with a total of four specimens in the National Museum collection seem referable to Jeffreys' species. The American specimens average a trifle more in diameter as compared with the specimens in the Jeffreys collection but differ in no other character. They are probably the most featureless of all the *Caduli*. The American shells may be described as small, gently curved, slightly contracted at both ends, otherwise of about equal caliber. They have no swelling. The anterior aperture and the apical orifice are of about equal size, and both are round. The anterior one is slightly oblique. There are no recognizable apical features. Measurements are:

Length, 7.3 mm.; diameter, 1.7 mm.; anterior and apical apertures, 1.4 mm. (Verrill).

Length, 7 mm.; diameter, 1.25 mm.; anterior and apical apertures, 1 mm.

Length, 8.1 mm.; diameter, 1.87 mm. (Jeffreys).

In the museum collection are a lot of two specimens, Cat. No. 38030, U.S.N.M., from the U. S. B. F. Station 2041, off Nantucket Shoals, in 1,608 fathoms, bottom of globigerina ooze, temperature 38° F., and a lot of two specimens, Cat. No. 38692, U.S.N.M., from the U. S. B. F. Station 2221, south of Marthas Vineyard, in 1,525 fathoms, bottom of gray ooze, temperature 36.9° F.

Jeffreys' records are also abyssal from off the West Coast of Ireland. These little deep water shells are almost devoid of characters and look like unidentifiable fragments. This species is the only one so far known in our faunal area with approximately equal sized openings and can not very well be grouped with any other species.

The following two species, *Cadulus acus* and *C. dominguensis*, possibly identical, may be separated from all other known *Caduli* of our faunal areas by reason of their extreme slenderness and by the position of the equator immediately behind the anterior aperture so that the shells superficially appear to belong to the *Dentalia* rather than to the *Caduli*. This is the Group 4 referred to in the comments on the subgenus *Gadila*.

CADULUS (GADILA) ACUS Dall.

Plate 20, fig. 11, 13.

1889. *Cadulus acus* Dall, Bull. Mus. Comp. Zool., vol 18, p. 432, pl. 27, fig. 11.
1889. *Cadulus acus* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 11.
1898. *Cadulus (Gadila) acus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 191, pl. 36, fig. 27.
1901. *Cadulus acus* Dall and Simpson, Bull. U. S. Fish Comm. for 1900, p. 457.
1903. *Cadulus acus* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 36, fig. 27.

The shell is small, exceedingly slender, slightly curved, very gradually and evenly increasing in diameter from a very small apical orifice to the equator, situated immediately back of the anterior aperture, from which point the cylinder rather abruptly contracts in the short distance thence to the larger aperture. There is no local swelling and the shell is not flattened. Many growth lines upon the posterior one-third of the shell are emphasized into almost a sculptural feature of densely packed circular riblets. The surface in all the specimens of the type lot is remarkably variegated by bands of greater opacity of varying widths. The apical features are simple. Measurements are:

Length, 8 mm.; diameter, 0.75 mm.; anterior aperture, 5 mm.; apical aperture, 0.12 mm. (Dall).

The type, Cat. No. 95379, U.S.N.M., was collected by Couthouy in 30 fathoms, and is from a lot of many specimens.

In the National Museum collection are also a lot of specimens, Cat. No. 161583, U.S.N.M., from the U. S. B. F. Station 6062, in Mayaguez Harbor, Porto Rico, 25 fathoms, bottom of sand and mud, temperature 75.8° F.; one specimen, "Santo Domingo," Cat. No. 314820, U.S.N.M., from Sowerby and Fulton; lot of three specimens, Cat. No. 108173, U.S.N.M., from U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of gray sand, temperature 46.3° F. The deeper and colder water station of this last lot raises a doubt as to the proper identification of these shells. However, the likelihood of the dead specimen being swept off the Bahaman platform near-by may be considered.

Other lots in the Philadelphia Academy of Natural Sciences collection are from Charlotte Amalia Harbor, St. Thomas, 5 fathoms;

Monkey River, British Honduras; Porto Barrios and Livingston, Guatemala; Belize Harbor.

These sharply pointed little shells have a superficial resemblance to *Dentalium* tips and are lacking in many of the conventional *Cadulus* characters. The fact that the equator and peristome do not coincide removes at once the suspicion of *Dentalium* when the specimens are carefully examined. The two species—*Cadulus elongatus* and *C. greenlawi*, heretofore described—resemble *C. acus* in the general elongate slender form, but their more posterior position of equator and their flattened dorsal area just back of the aperture exclude them from the *acus* group.

CADULUS (GADILA) DOMINGUENSIS Orbigny.

Plate 20, fig. 3.

1853. *Dentalium dominguense* ORBIGNY, Sagra Hist. Cuba, Moll., vol. 2, p. 201, pl. 25, figs. 7, 8, 9 ("1846").

1878. *Dentalium dominguense*, ARANGO, Contrib. Fauna Mal. Cubana, p. 232.

1898. *Cadulus* (*Gadila*) *dominguensis*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 191, pl. 36, fig. 26.

Shell "lengthened, narrow, arcuate, smooth, and shining; apex acuminate. Aperture contracted, oblique, oval. L. 7."

The type is in the British Museum. Santo Domingo (Orbigny); Martinique (Orbigny); Cuba (Orbigny); Playa del Chivo, Cuba (Arango).

There are no authentic specimens in the National Museum. The very meager description of Orbigny makes any positive identification impossible, but it is certainly very closely allied to, if not identical with, Dall's *Cadulus acus*. Until a comparison can be made with the Orbigny type I have thought it better not to unite them specifically.

Subgenus CADULUS Philippi, 1884.

1884. *Cadulus* PHILIPPI, Enumeratio Molluscorum Siciliae, vol. 2, p. 209.

"Shell somewhat cask-shaped, short and obese, conspicuously swollen in the middle, tapering rapidly toward both ends; convex on all sides, though less so dorsally. Aperture with simple, thin peristome; anal orifice comparatively large, with simple edge contracted by a wide circular callus or ledge just within the opening." Type, *Cadulus ovum* Philippi from the Mediterranean. The above is quoted from Pilsbry and Sharp's clearer diagnosis of the subgenus.[1]

The subgenus includes the small very obese forms of *Caduli* which in some instances seem almost deformed by their large bulbous median swelling. In extreme examples, such as *C. ampullaceus* Watson, the two apertures are but slightly constricted openings at opposite ends of a globe-like shell. At the other extreme the divisional line between *Cadulus* and *Gadila* can not always be sharply drawn. As heretofore observed in the case of *Gadila* the value of the subgenus *Cadulus* is rather as an aid in grouping together a certain number of species by reason of a general similarity of form. Its biological significance is probably nil.

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[1] Tryon's Manual of Conchology, vol. 17, p. 156.

There are eight species of western Atlantic *Cadulus* at present known that clearly fall within the limits of this subgenus. They are specifically determinable chiefly upon their relative degrees of obesity and upon their size and general facies. A key would be of little use. These are *C. ampullaceus*, *C. exiguus*, *C. obesus*, *C. cucurbita*, *C. platensis*, *C. podogrinus*, *C. halius*, and *C. tersus*. Three species, *C. curtus*, *C. congruens*, and *C. transitorius*, occupy an intermediate position, not having fully developed the bulbous character of *Cadulus* s. s. Their assignment to either *Gadila* or *Cadulus* is entirely arbitrary.

CADULUS (CADULUS) CURTUS Watson.

Plate 20, fig. 7.

1879. *Cadulus curtus* Watson, Journ. Linn. Soc. London, vol. 14, p. 527.
1885. *Cadulus curtus* Watson, *Challenger* Report (*Scaphopoda*), p. 21, pl. 3, fig. 7.
1898. *Cadulus* (*Gadila*) *curtus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 175, pl. 25, fig. 60.

The shell is short, broad, and semiobese, almost straight, narrowed at both ends, with an approximately median swelling, giving to its convex side a humpbacked appearance. The concave side is almost a stright line, though curved a little posteriorly, and with a considerable convexity at the equator. The section is almost round. The anterior aperture is rather large, slightly oblique, and has a thin edge. The apical orifice is small. Apical characters are doubtful, "chipped."

The type is in the British Museum and measures—Length, 2.5 mm.; diameter, 0.75 mm.; anterior aperture, 0.25 mm. (Watson). It was taken by the *Challenger* at its station 24, off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

This species is one of the numerous barrel-shaped forms placed under the section *Cadulus*. There are no examples in the National Museum collection, nor have I seen specimens.

CADULUS (CADULUS) CONGRUENS Watson.

Plate 20, fig. 10.

1879. *Cadulus curtus congruens* Watson, Journ. Linn. Soc. London, vol. 14, p. 527.
1885. *Cadulus curtus congruens* Watson, *Challenger* Report (*Scaphopoda*), pp. 21, 22, pl. 3, fig. 7 (*a*).
1898. *Cadulus curtus congruens*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 175, pl. 25, fig. 59.

The author describes his subspecies, here given full specific value, by comparison with the type of *Cadulus curtus*. It is one-third larger (length about 3.3 mm.) with less oblique aperture (?). The section is round instead of being slightly compressed, as in typical *C. curtus*

The type, in the British Museum, is from the same *Challenger* station as of *C. curtus* (24), off Culebra Island, West Indies, in 390 fathoms, bottom of Pteropod ooze.

I have seen no specimens and can not refer to the species with certainty any specimens in the National Museum. The fact that it is not a compressed shell, as is *C. curtus*, and that it is also one-third larger, seems sufficient evidence to warrant a specific separation.

CADULUS (CADULUS) TRANSITORIUS, new species.

The shell is very small, quite inflated, its greatest diameter being about median, but the equator is without any local swelling; the cylinder is decidedly compressed laterally, giving to the oblique aperture a somewhat oval outline, but the apical orifice is round, or in a subspecific form very slightly flattened. The convex outline forms a regular arc without irregularities at any point; the concave outline is actually concave only anteriorly, is bulged out at the equator, and is a straight line posteriorly. The apical orifice is somewhat constricted, but remains relatively large for the genus, and is girdled within by a circular shelf, showing from without as an internal white callous ring. The apical features are simple. Measurements are:

Length, 3 mm.; diameter, 0.90 by 0.75 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.4 mm. (type of typical subspecies).

Length, 3.5 mm.; diameter, 0.9 by 0.8 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.4 mm. (type of *C. t. barbadensis*).

This little *Cadulus* may eventually be connected by intermediates with *C. verrilli*, and thus be shown merely to constitute a southern race of that northern Gulf Stream species. It has, however, a more inflated shell than has *C. verrilli* and seems to stand upon the border line between the subgenera *Gadila* and *Cadulus*. I have included under the name a number of lots that vary slightly from the type, as I dislike to multiply the species of these minute *Caduli* without more abundant evidence. A lot from Old Providence is more particularly aberant in having the inflation more localized. These, with *C. verrilli*, *C. atlanticus*, and *C. mayori* resemble the species of a European group represented by *C. jeffreysi* Monterosato, and including *C. gracilis* Jeffreys and *C. propinquus* Sars; but a careful comparison with authors' examples of these eastern Atlantic forms convinces me of their specific differences, although superficially they appear to be so very much alike. On the other hand, it bears close affinities with the group of bulbous species under the subgenus *Cadulus*, and among which I believe it should be placed.

CADULUS (CADULUS) TRANSITORIUS TRANSITORIUS, new subspecies.

Plate 19, fig. 6.

The shell of this, the typical subspecies of *Cadulus transitorius*, is described under the heading of that species. It includes, however, only those forms having a round apical orifice. The type is somewhat smaller than that of the other subspecies recognized.

The type, Cat. No. 330589, U.S.N.M., was dredged by the *Albatross* at the U. S. B. F. Station 2654, off the Little Bahama Bank, in 660 fathoms, bottom of yellow ooze, temperature 39.3° F., and measures—length, 3 mm.; diameter, 0.9 by 0.75 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.4 mm.

Other lots in the museum collection are as follows:

Number of specimens.	Cat. No. U.S.N.M.	Locality.	Remarks.
[1] 1	330589	Little Bahama Bank, U. S. B. F. Station 2654....	660 fms., yl. oz., 39.3°.
1	330678	Off Cape Canaveral, Florida, Station 2660........	504 fms., 45.7°, yl. for.
119	108170	Off Fernandina, Florida, Station 2668............	294 fms., 46.3°, yl. s. dd. co.
5	323779	Gulf of Mexico, off Cape San Blas, U. S. B. F. Station 2399.	196 fms., 51.6°, gu. m.
1	323813	Gulf of Mexico, off Cape San Blas, U. S. B. F. Station 2400.	169 fms., gu. m.
2	314821	Caesar's Creek, Florida, *Eolis* Station 376........	90 fms.
2	314822	Fowey, Florida, *Eolis* Station 381.................	125 fms.
2	314823	Old Providence Island, north of Colon, U. S. B. F. Station 2150.	382 fms., wh. crs. s.

[1] Type.

CADULUS (CADULUS) TRANSITORIUS BARBADENSIS, new subspecies.

Plate 19, fig. 7.

One specimen in the United States National Museum collection from Barbados, taken in 100 fathoms, and which had been referred to Monterosato's *Cadulus jeffreysi*, must be removed from that Mediterranean species, although it is closely related. It is only separable from *C. t. transitorius* in its greater measurement and in a slight degree of flattening of the apical orifice. The specimen is not a very good one, but the variation from the typical subspecies is obvious.

The type, Cat. No. 95375, U.S.N.M., measures—length, 3.5 mm.; diameter, 0.9 by 0.8 mm.; anterior aperture, .5 mm.; apical aperture, .4 mm. It was dredged by the Coast Survey steamer *Hassler* in 1871, off Sandy Bay, Barbados, in 100 fathoms.

A single specimen was also taken by the Iowa State University Expedition of 1918 in 80 fathoms, off Bridgetown, Barbados. This is a better specimen and gives a correct measurement of 4 mm. in length, the other dimensions being the same as of the type.

CADULUS (CADULUS) AMPULLACEUS Watson.

Plate 20, fig. 6.

1879. *Cadulus ampullaceus* Watson, Journ. Linn. Soc. London, vol. 14, p. 529.

1885. *Cadulus ampullaceus* Watson, *Challenger* Report (*Scaphopoda*), p. 23, pl. 3, fig. 11.

1898. *Cadulus* (*Cadulus*) *ampullaceus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 158, pl. 25, fig. 58.

The shell is exceedingly small and bulbous, both the convex and "concave" outlines being very convex, though not equally so. The apertures appear to be but mere contractions at opposite ends of a bulbous swelling, forming two short projecting tubes. The equator is postmedian. The anterior aperture is large and slightly oblique. The apical orifice is slightly oval and smaller than the other, and is narrowed inside by a callous ring, reducing its caliber by about one-half. The margin of this ring is "formed by the projecting end of a short pipe, which passes up into the interior of the shell." No apical features are mentioned by the author. Measurements are:

Length, 2 mm.; diameter, 1.17 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.4 mm. (Watson.)

The shell "differs from *exiguus* in being rounder, has no tube anteriorly, is not nearly so elongated posteriorly, and is provided with a distinct posterior pipe." (Watson.)

The type is in the British Museum and was taken by the *Challenger* at station 24, off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

There are no specimens in the National Museum collection positively referable to this species. It is known to me only by Watson's description and figures. In this form the very extreme of the bulbous shell is reached.

CADULUS (CADULUS) EXIGUUS Watson.

Plate 20, fig. 9.

1879. *Cadulus exiguus* WATSON, Journ. Linn. Soc. London, vol. 14, p. 528

1885. *Cadulus exiguus* WATSON, *Challenger* Report (*Scaphopoda*), p. 23, pl. 3, fig. 10.

1898. *Cadulus* (*Cadulus*) *exiguus*, PILSBRY and SHARP, Tryon's Man. Conch., vol. 17, p. 159, pl. 25, fig. 61.

The shell is very small, short, inflated, the bulbous swelling pinched in to form two projecting short tubes at the posterior and the anterior ends, the posterior tube being the smaller. The anterior aperture is large, not oblique, and thin edged. The apical orifice is small and narrowed within by an opaque callous ring forming a minute circular shelf. The apical features are described as "chipped." Measurements are:

Length, 1.9 mm.; diameter, 0.875 mm.; anterior aperture, 0.4 mm.; apical aperture, 0.25 mm. (Watson.)

The type is in the British Museum and was taken by the *Challenger* at Station 24 off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

A single specimen in the museum collection, Cat. No. 216663, U.S.N.M., is from the Bahamas, collected by the *Albatross*, but without station number or other record, and is referable to this species. One specimen was taken by the State University of Iowa Expedition at station 10, off Bridgetown, Barbados, in 100 fathoms.

CADULUS (CADULUS) OBESUS Watson.

Plate 20, fig. 8.

1879. *Cadulus obesus* Watson, Journ. Linn. Soc. London, vol. 14, pp. 527, 528.
1881. *Cadulus obesus*, Dall, Bull. Mus. Comp. Zool., vol. 9, p. 36, in part.
1885. *Cadulus obesus* Watson, *Challenger* Rept. (*Scaphopoda*), p. 22, pl. 3, fig. 8.
1889. *Cadulus obesus*, Dall, Bull. Mus. Comp. Zool., vol. 18, p. 431, in part.
1898. *Cadulus* (*Cadulus*) *obesus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 159, pl. 25. fig. 53.

The shell is very small, short, inflated in the middle, narrowed at both ends, but more so posteriorly, very slightly curved and a trifle flattened. The convex outline is strongly arched and swollen centrally with a straighter very rapid descent from the equator to the anterior aperture. The "concave" outline is strongly bulged out centrally and is very little concave at any point and not at all so as a whole. The anterior aperture is large and not oblique. The apical orifice is smaller and has a callous ring within. The apical features are described as "chipped." Measurements are:

Length, 2.7 mm.; diameter, 1 mm.; anterior aperture, 0.5 mm.; apical aperture, 0.2 mm. (Watson).

The type is in the British Museum and is from the *Challenger* Station 24 off Culebra Island, in 390 fathoms, bottom of Pteropod ooze.

The only museum lot referable to this species is one of 20 specimens, Cat. No. 108171, U. S. N M., dredged by the *Albatross* at the U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of gray sand, temperature 46.3°. Doctor Dall refers to this species a lot from the United States Coast Survey Station 20, off Bahia Honda, in 200 fathoms. It is in the Museum of Comparative Zoology collection. The shells differ from Doctor Watson's *C. exiguus* only in size, the relative proportions being substantially the same.

CADULUS (CADULUS) CUCURBITUS Dall.

Plate 20, fig. 1.

1881. *Cadulus cucurbitus* Dall, Bull. Mus. Comp. Zool., vol. 9. p. 35.
1889. *Cadulus cucurbitus* Dall, Bull. Mus. Comp. Zool., vol. 18, p. 431, pl. 27, fig. 12 (*d*).
1889. *Cadulus cucurbitus* Dall, Bull. 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 12 (*d*).
1898. *Cadulus* (*Cadulus*) *cucurbitus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 161, pl. 25, fig. 54.
1903. *Cadulus cucurbitus* Dall, Bull, 37, U. S. Nat. Mus., p. 78, pl. 27, fig. 12 (*d*).

This little *Cadulus* was decribed by Doctor Dall from a single specimen by comparing it with *C. obesus* Watson and *C. tumidosus* Jeffreys, between which it occupies an intermediate position. As authentic examples of these two species used for reference are not readily available a supplemental description may be of service.

The shell is small, obese, with its equator about median or slightly posterior. The cylinder is round, at no point flattened. The convex side is strongly arched with a slight concavity just forward of the apical orifice. The "concave" side is strongly bulged out at the equator and somewhat concaved between the equator and the two ends. The apical orifice is round, pinched, and small but without any prominent opaque rings or circular ledges within. The anterior aperture in the type is broken and shows no characters. The apical orifice is simple.

The type is in the Museum of Comparative Zoology, Cat. No. 7750, and measures—length, 4 mm.; diameter, 1.25 mm.; anterior aperture, 0.62 mm.; apical aperture, 0.37 mm. It is from the United States Coast Survey Station 19, off Bahia Honda, Cuba, in 310 fathoms, bottom temperature 52.25° F.

The only specimen in the National Museum collection referable to this species, Cat. No. 314934, U. S. N. M., is from Barbados and collected by the State University of Iowa Expedition, the depth record lost. The very inflated shape, median equator, round section, and pinched in apical orifice are the main characters. It seems not very different from Watson's *Cadulus obesus* except in that it is much larger. It is also more inflated than *C. halius*.

CADULUS (CADULUS) PLATENSIS, new species.

Plate 20, fig. 14.

1889. *Cadulus tumidosus*, Dall, Proc. U. S. Nat. Mus., vol. 12, p. 295 (not of Jeffreys, 1877).

1898. *Cadulus tumidosus*, Pilsbry and Sharp, Tryon's Man. Conch., vol. 17, p. 160, in part.

The shell is small and obese, thick and solid, with a median equator, marked indistinctly by an obtuse angle and not flattened. The median swelling is pronounced and bulbous. Both apertures are rather large, the anterior one being oblique. The convex outline describes a fairly regular deep curve; the concave outline is bulged out at the equator and scarcely incurved at any point. No apical features are observable.

The type, Cat. No. 330845 (*a*), U. S. N. M., measures—length, 5.5 mm.; diameter, 1.6 mm.; anterior aperture, 0.9 mm.; apical aperture, 0.75 mm. It is from the U. S. B. F. Station 2764, off Rio de la Plata, in 11½ fathoms, bottom of sand and broken shells.

The type lot consists of three imperfect shells, none of which shows clearly the apical or anterior apertures, but they do show the general shape of the shell. There is an unusual degree of variation shown in the amount of median swelling and in the distinctness of the angled equator. These same variations are shown in Jeffreys' *Cadulus tumidosus*, to which northern Atlantic species this species is certainly very closely allied. Our is a somewhat larger shell than *C. tumidosus*, but were both inhabitants of the same faunal area their specific identity could hardly be questioned.

Another lot consisting of but one very imperfect specimen, Cat. No. 95447, U.S.N.M., from the U. S. B. F. Station 2760, off Ceara, Brazil, in 1,019 fathoms, bottom of broken coral, temperature 39.5° F. is probably this species. It has an extraordinarily thick and heavy shell and possesses a decidedly carinate equator, thereby again suggesting Jeffreys' *C. tumidosus*.

Two more lots in the National Museum collection from the Gulf Stream off Florida and Georgia are also included, thus indicating for this species very extended geographical range. These are: Two specimens, Cat. No. 108279, U.S.N.M., taken by the *Albatross* at the U. S. B. F. Station 2415, off Georgia, in 440 fathoms, bottom of coarse sand, shells, and foraminifera, temperature 45.6° F.; and eight specimens, Cat. No. 108172, U.S.N.M., from the U. S. B. F. Station 2668, off Fernandina, Florida, in 294 fathoms, bottom of gray sand and dead coral, temperature 46.3° F.

The rather startling association of species from such divergent stations as a thousand fathoms and a littoral one of 11½ fathoms has been already presented by other forms taken by the *Albatross* from this same inshore haul, off the Rio de la Plata. Our very imperfect knowledge of the faunal conditions of the mollusks of the southeast coast of South America makes any explanation difficult. The correctness of the record is also to be questioned.

CADULUS (CADULUS) PODAGRINUS, new species.

Plate 20, fig. 5.

The shell is small, much inflated, and suddenly contracting into a short pinched-in dorso-ventrally flattened neck, terminating in an oval-shaped apical orifice. The convex outline forms a strongly curved arch from the point of contraction at the neck to the margin of the very oblique anterior aperture. On the short "neck" itself the same outline is actually concave. The "concave" outline is almost straight with a wide convexity at the equator which is slightly post median in position. Within the apical opening are callous rings. The apical features are simple.

The type is in the State University of Iowa collection. It measures—4.5 mm.; diameter, 1.25 mm.; anterior aperture, 0.75 mm.; apical aperture, 0.5 mm. It was dredged off English Harbor, Antigua, in 120 fathoms.

The extreme shortness of the posterior portion and the sudden contraction of the bulbous swelling, along with the posterior position of the equator, give to the shell a curiously humpbacked appearance. Its nearest ally is *Cadulus halius*, from which it differs in the humped appearance given by the sudden constriction of the bulbous portion. Both this and *C. halius* were taken in the same haul of the dredge, but among a number of specimens of each there are no intermediates.

A single specimen in the lot is smaller—length, 4.2 mm.; diameter, 1.1 mm., but otherwise agrees.

Topotypes, a lot of two specimens, Cat. No. 314935, U.S.N.M., dredged by the State University of Iowa Expedition at station 115, off English Harbor, Antigua, in 120 fathoms, are the only specimens in the National Museum collection.

CADULUS (CADULUS) HALIUS, new species.

Plate 20, fig. 12.

The shell is small, rather inflated, with a median equator, rather short and somewhat flattened, with an oval apical opening. The "neck" or posterior end is contracted, though not abruptly so. The convex outline posteriorly is a little concave, but is very convex over the bulging median portion and very slightly convex anteriorly. The concave outline is modified by a convex bulge in the median portion. The median equator is not marked by any carination. The anterior aperture is small and oblique. Some opaque rings within the apical orifice are quite noticeable. Apical features are simple.

The type is in the collection of the State University of Iowa, and measures—length, 5.5 mm.; diameter, 1.3 mm.; anterior aperture, 0.6 mm.; apical aperture, 0.5 mm. It was dredged off English Harbor, Antigua, in 120 fathoms.

This species resembles *Cadulus podagrinus* in several features, but lacks the exaggerated humpbacked appearance. The bulbous portion of the shell more slowly contracts into the pinched-in neck and has a more median position of the equator. Although the two species inhabit the same localities, there are no intermediates among the specimens before me.

Cotypes, a lot of four specimens, Cat. No. 314936, U.S.N.M., were obtained by the State University of Iowa Expedition of 1918 at station 115, in 120 fathoms, off English Harbor, Antigua.

CADULUS (CADULUS) TERSUS, new species.

Plate 20, fig. 4.

The shell is small, rather strongly curved, with very small apertures. The equator is slightly anterior to a median position and marks a pronounced local swelling. The convex outline describes an even deep arc; the concave outline has a convex bulge at the equator. The neck or posterior portion is quite long and round, ending in a very small round apical opening. The anterior aperture is not oblique, but is slightly oval, the anterior portion of the shell being a little flattened dorso-ventrally. Just within the apical orifice is a callous ring. The lateral outlines viewed dorsally or ventrally taper evenly from the equator to the small ends, giving a fusiform shape to the cylinder. The apical features are simple.

The type is in the State University of Iowa collection and measures—length, 3.1 mm.; greater diameter, 0.8 mm.; lesser diameter, 0.7 mm.; anterior aperture, 0.35 mm.; apical aperture, 0.2 mm. It was taken at the State University of Iowa Expedition Station 51, off Barbados, in 33 fathoms.

This fusiform little shell resembles a very small *Cadulus bushii,* but its localized swelling and very small openings and simple apex seem to denote a position under the subgenus *Cadulus.* It differs from all the others of the group in its fusiform shape, caused by the evenly converging lateral outlines. In the museum collection is a single specimen, Cat. No. 314937, U.S.N.M., collected by the State University of Iowa Expedition of 1918 at station 80, off Bridgetown, Barbados, in 40 to 75 fathoms.

EXPLANATION OF PLATES

Plate 1.

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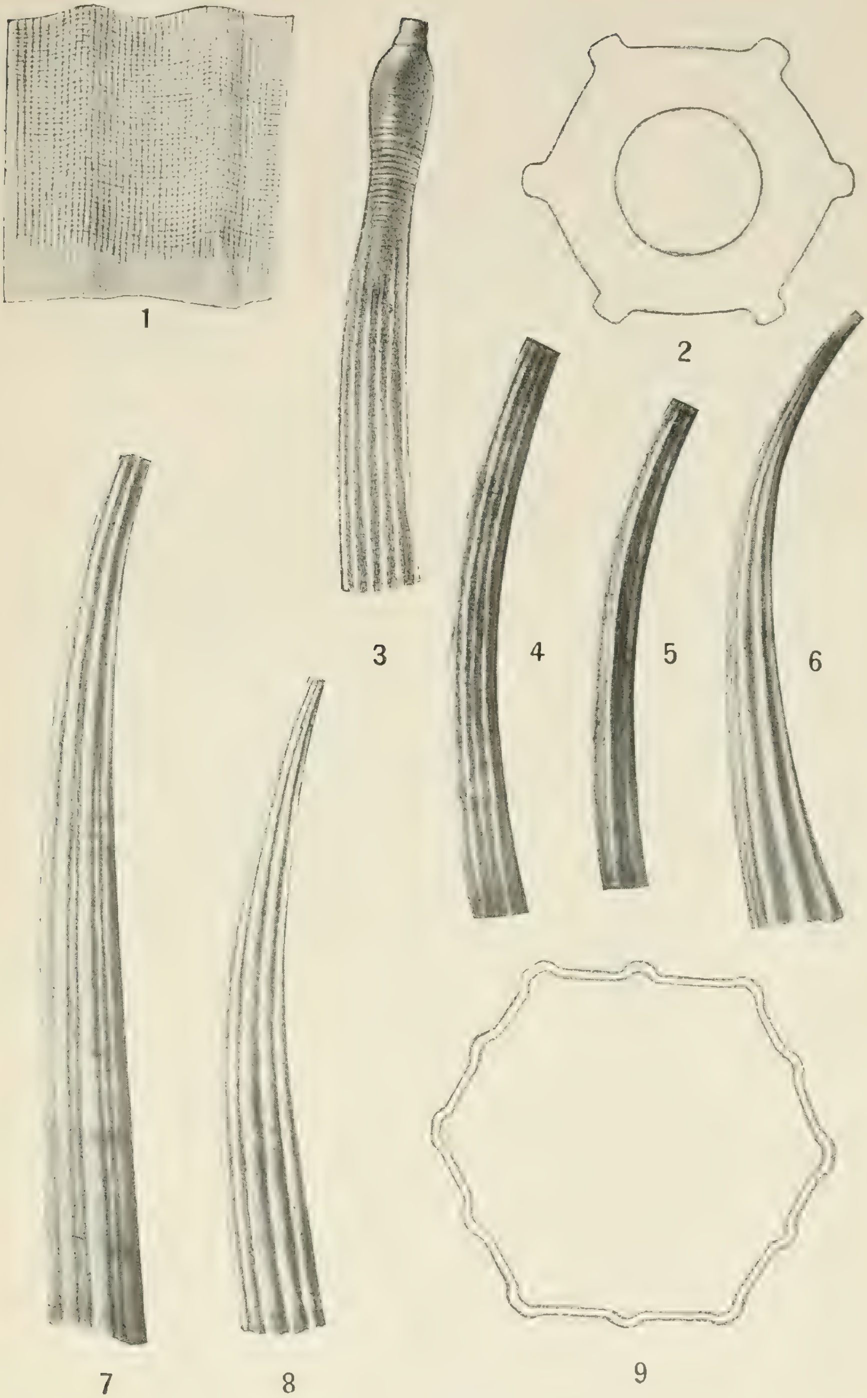

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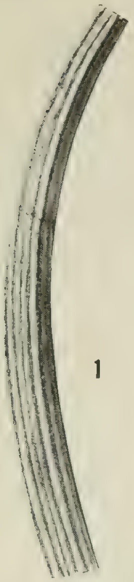
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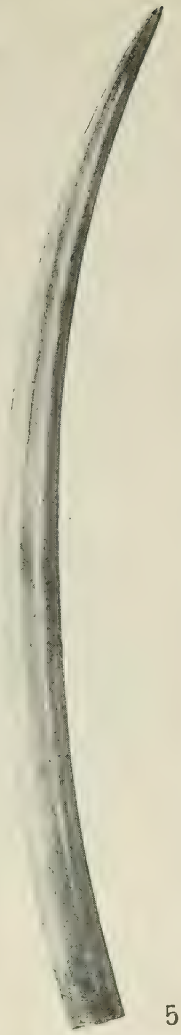
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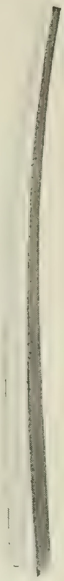
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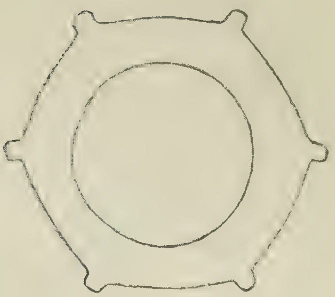
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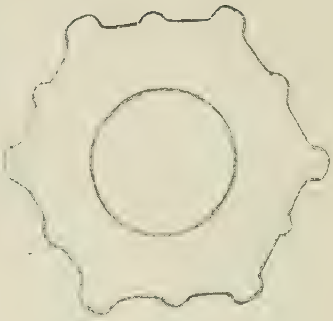
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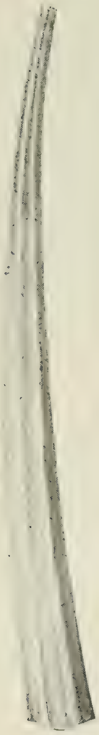
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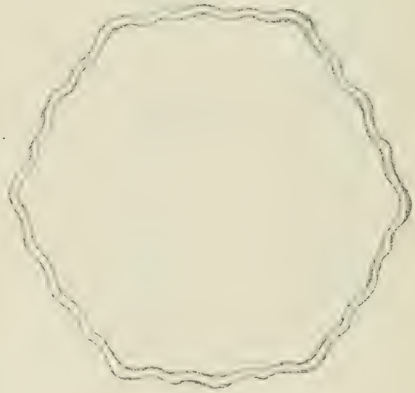
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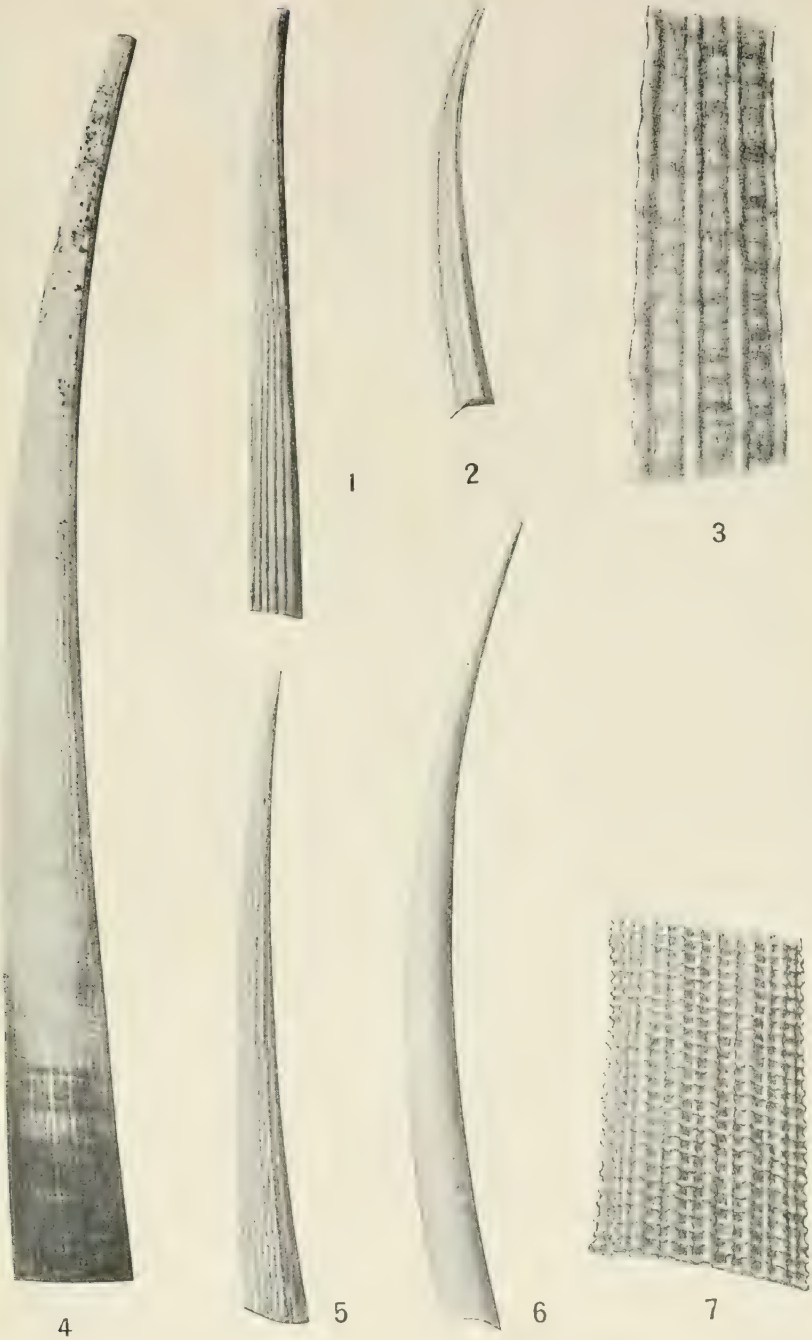

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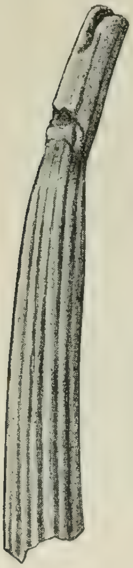
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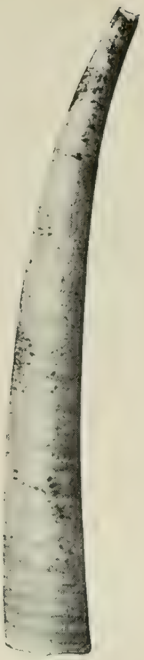
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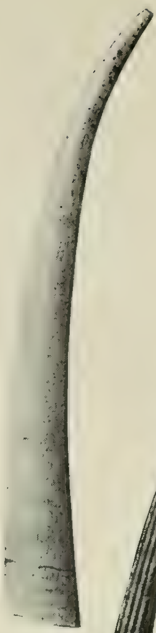
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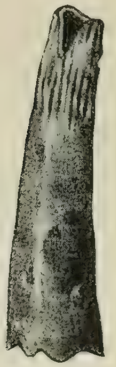
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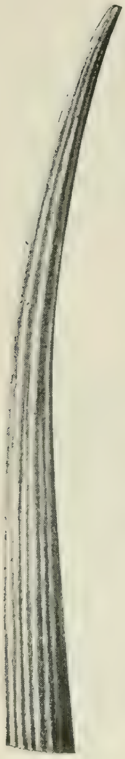
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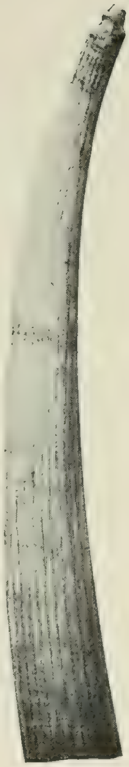
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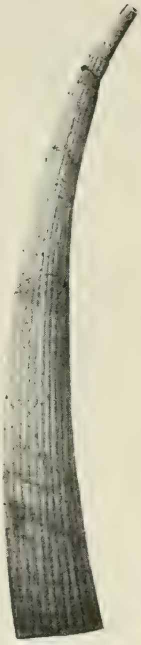
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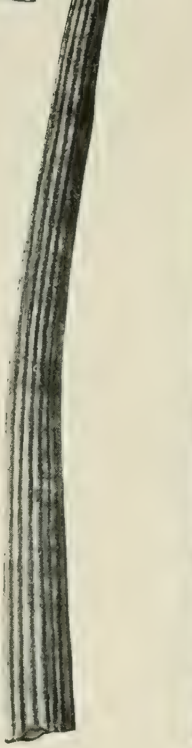
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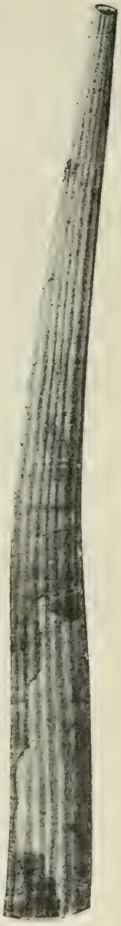
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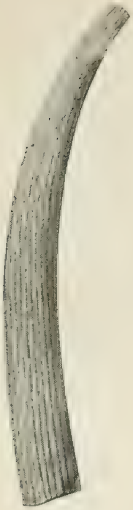
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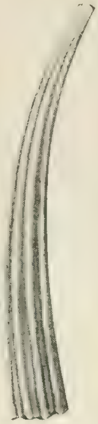
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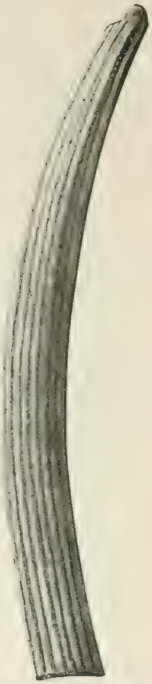
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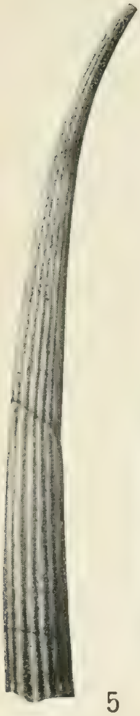
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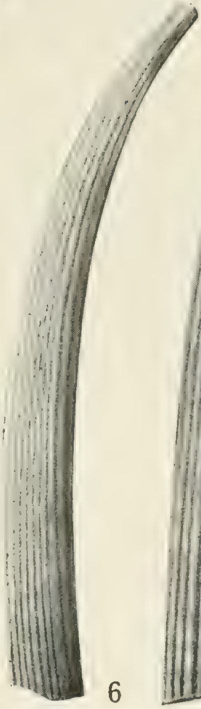
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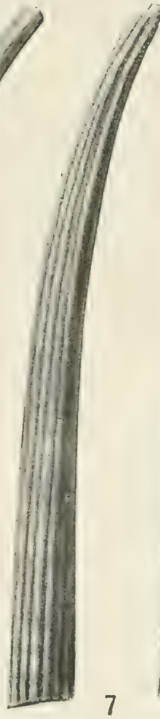
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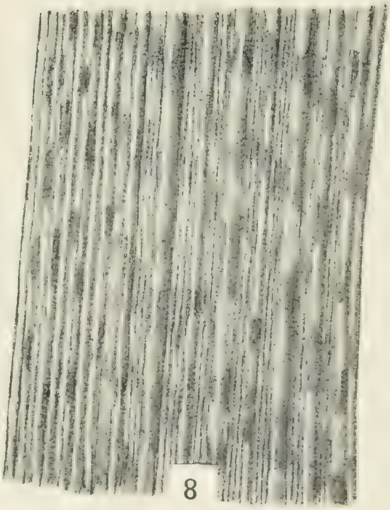
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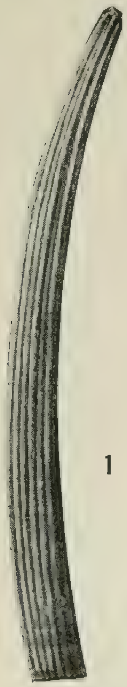

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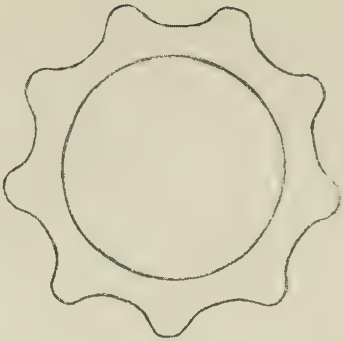

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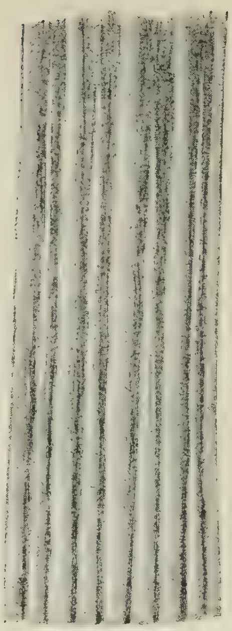

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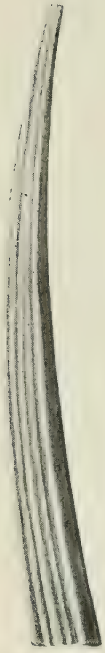

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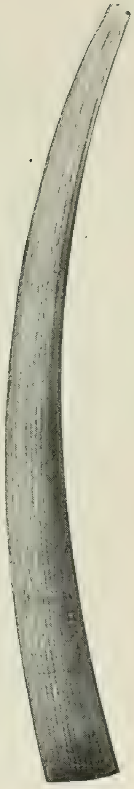

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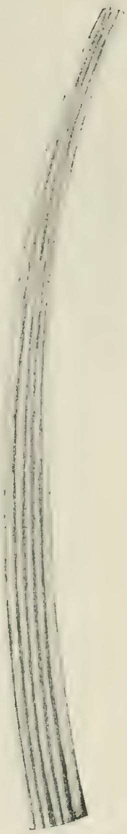

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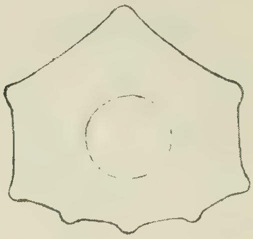

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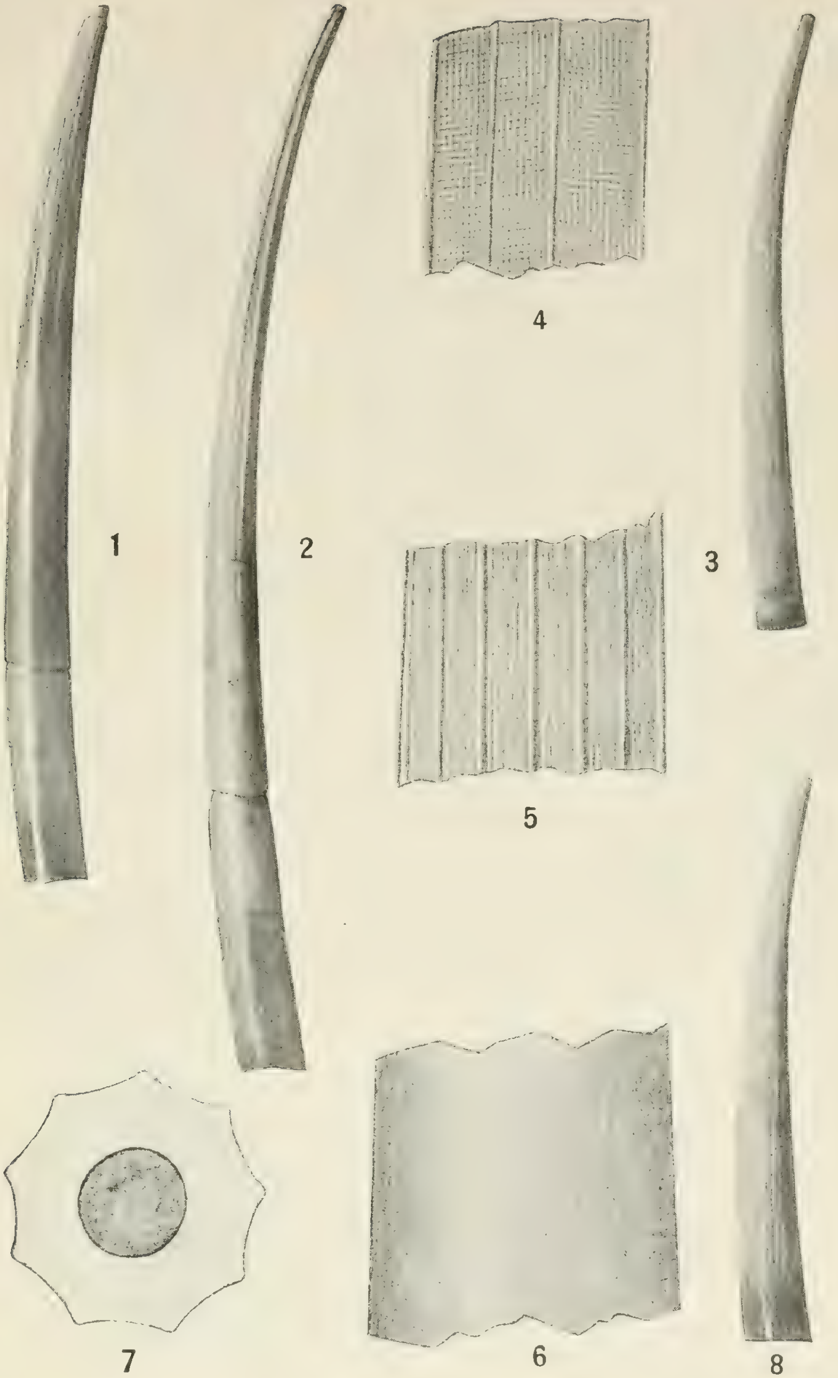

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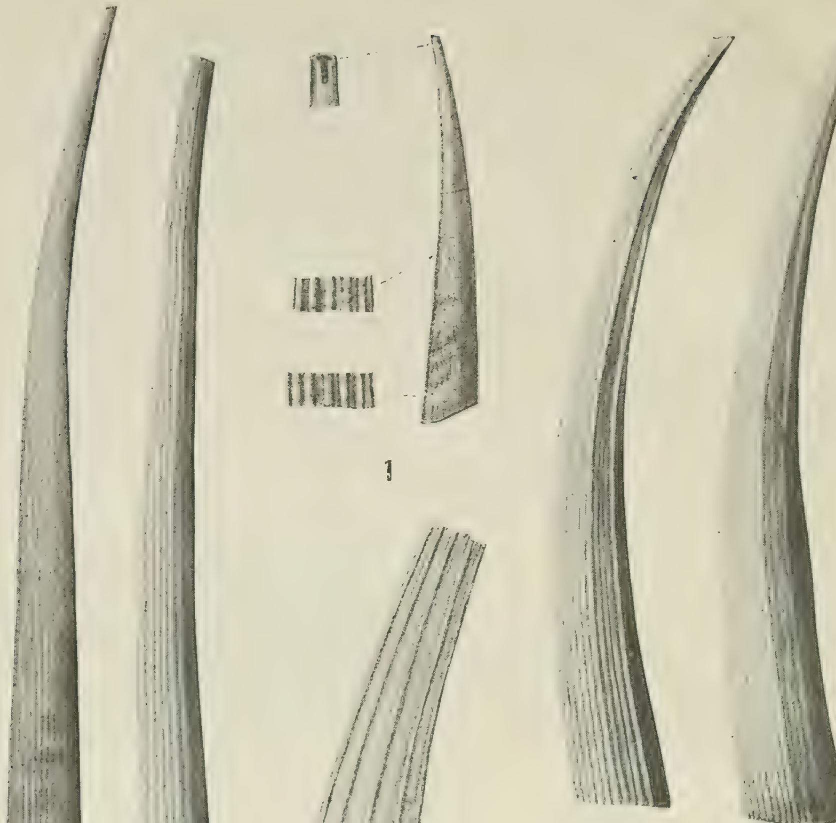

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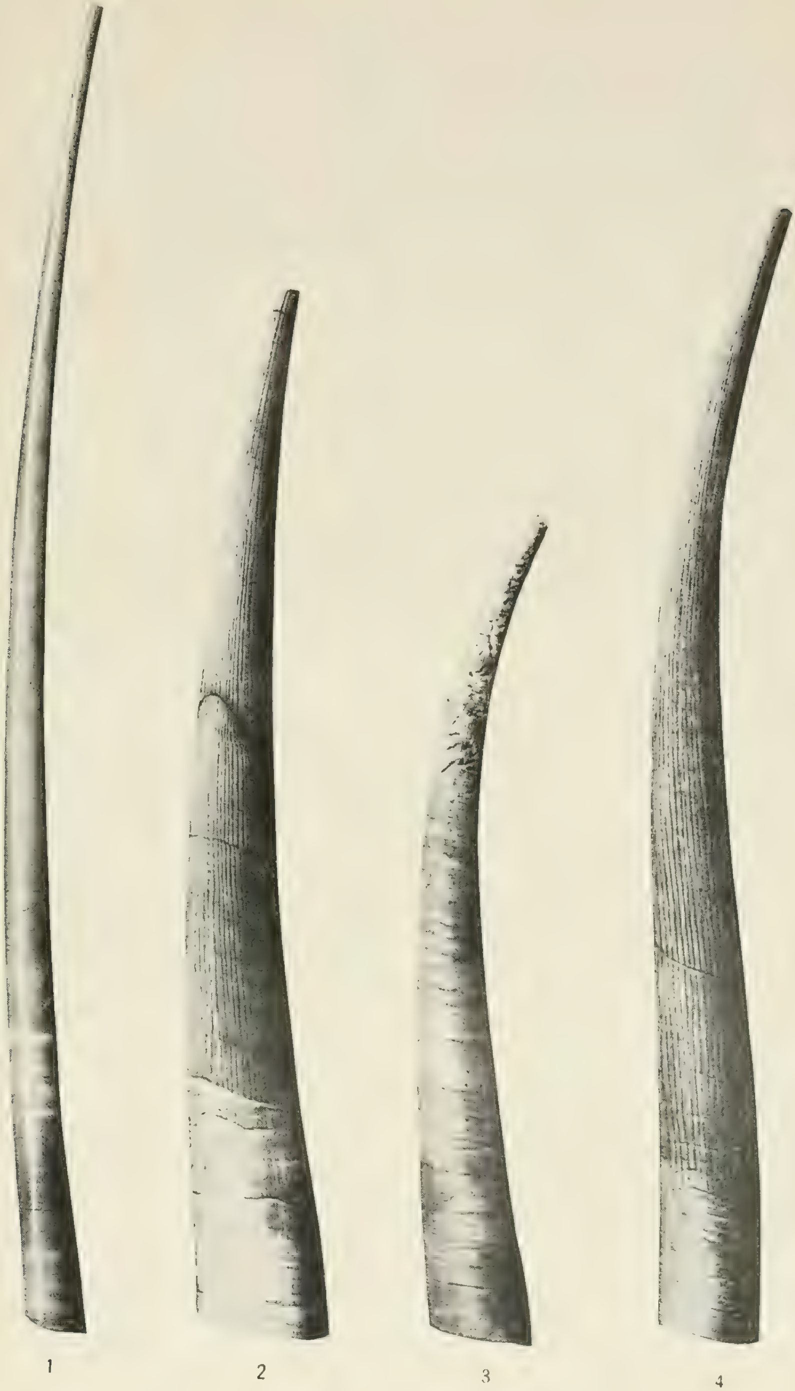

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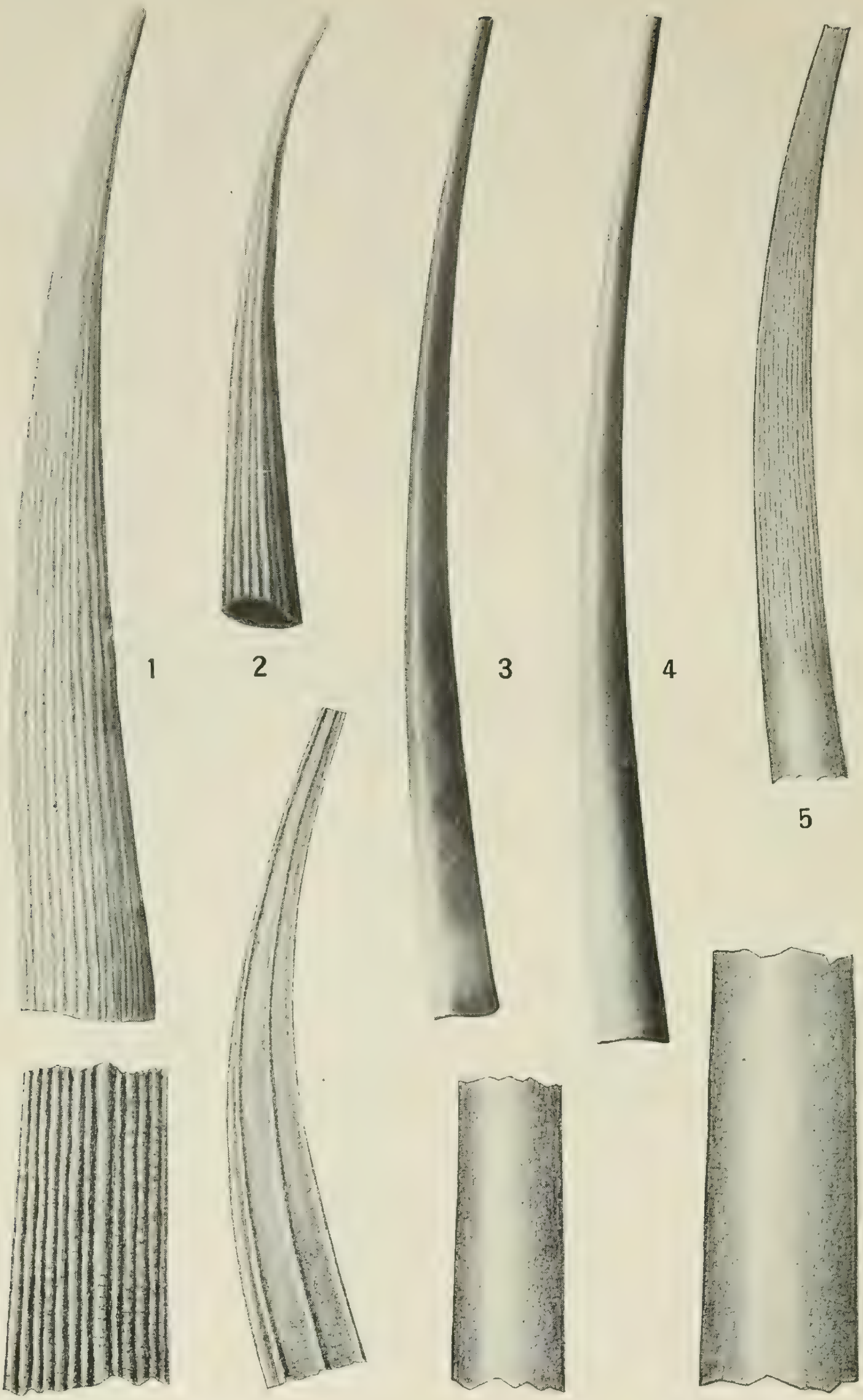

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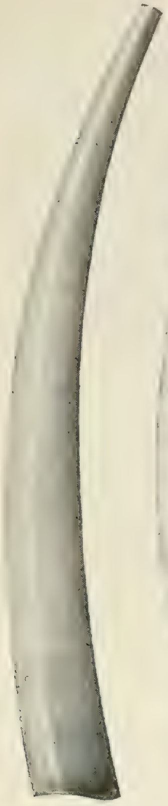
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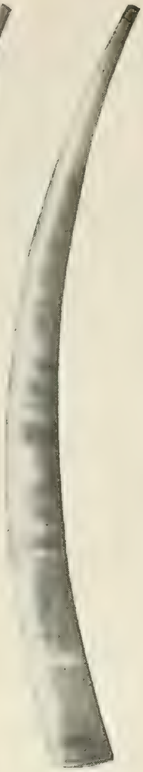
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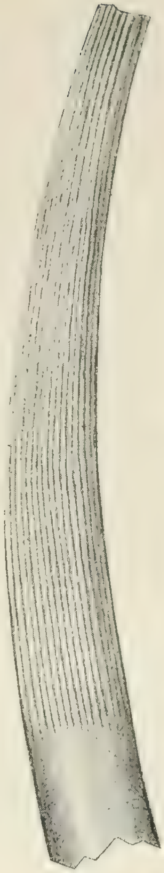
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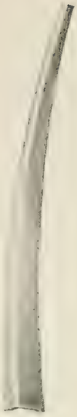
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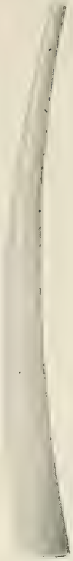
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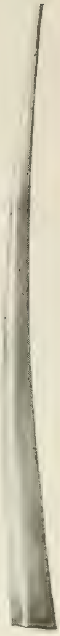
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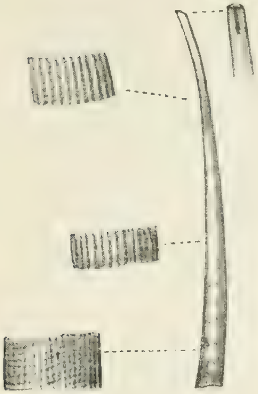
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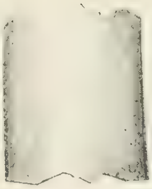
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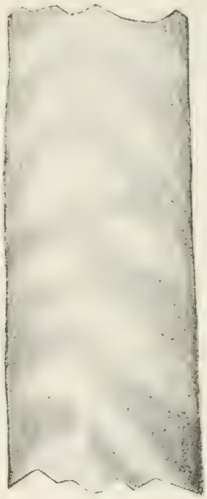
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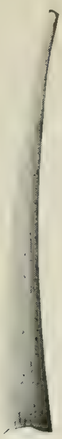

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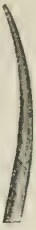

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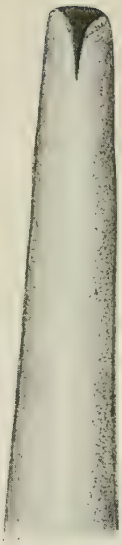

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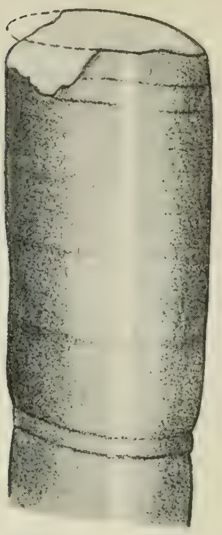

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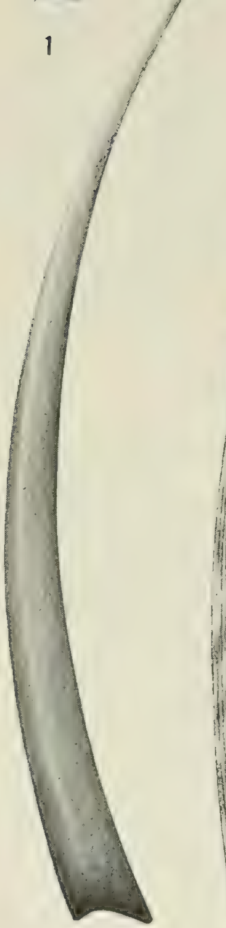

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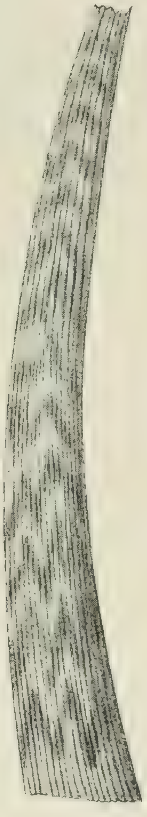

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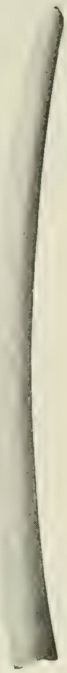

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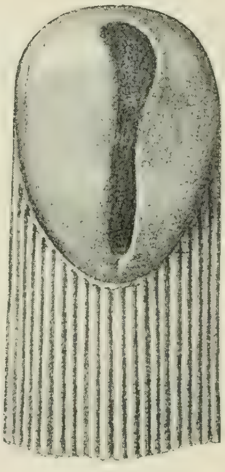

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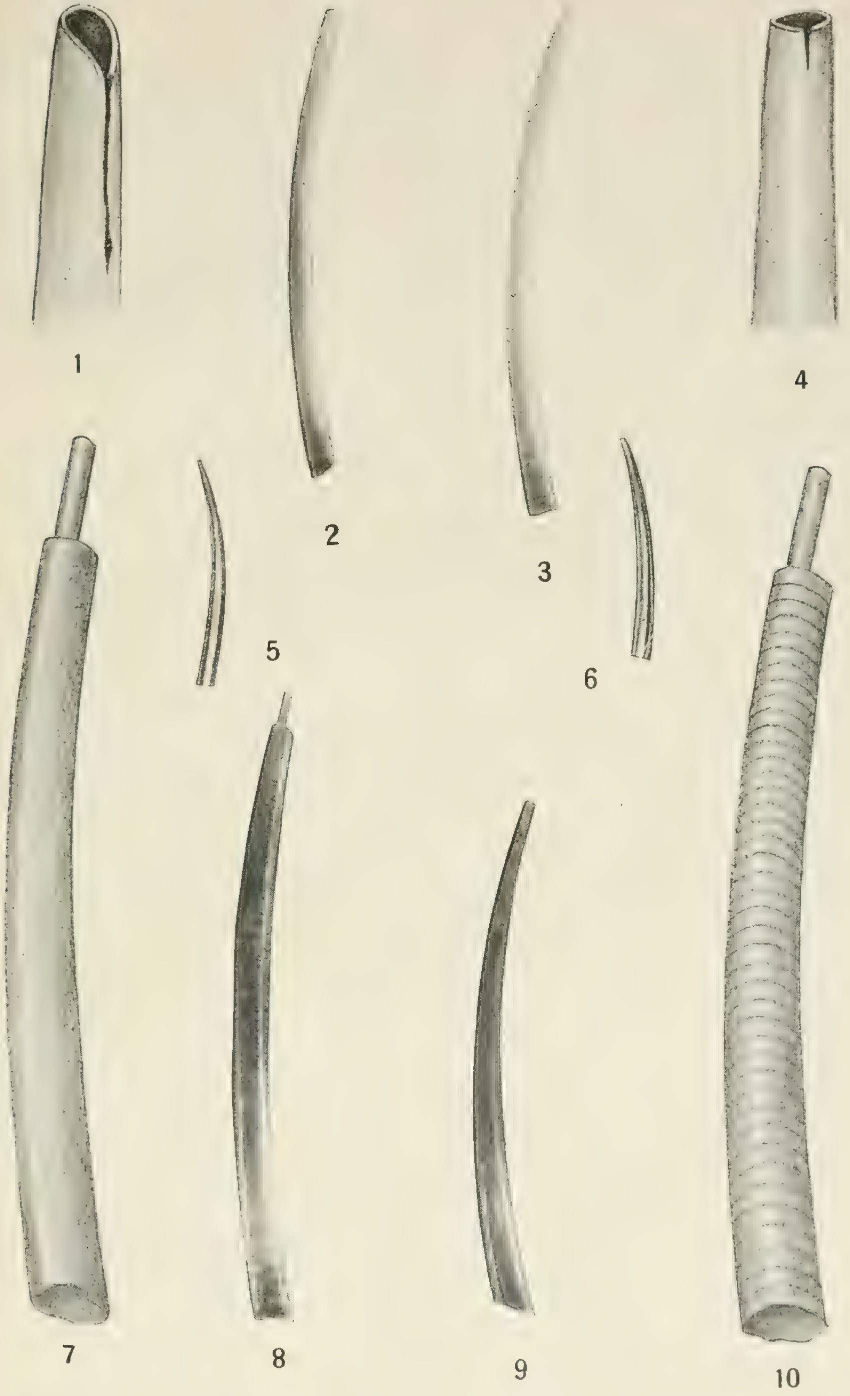

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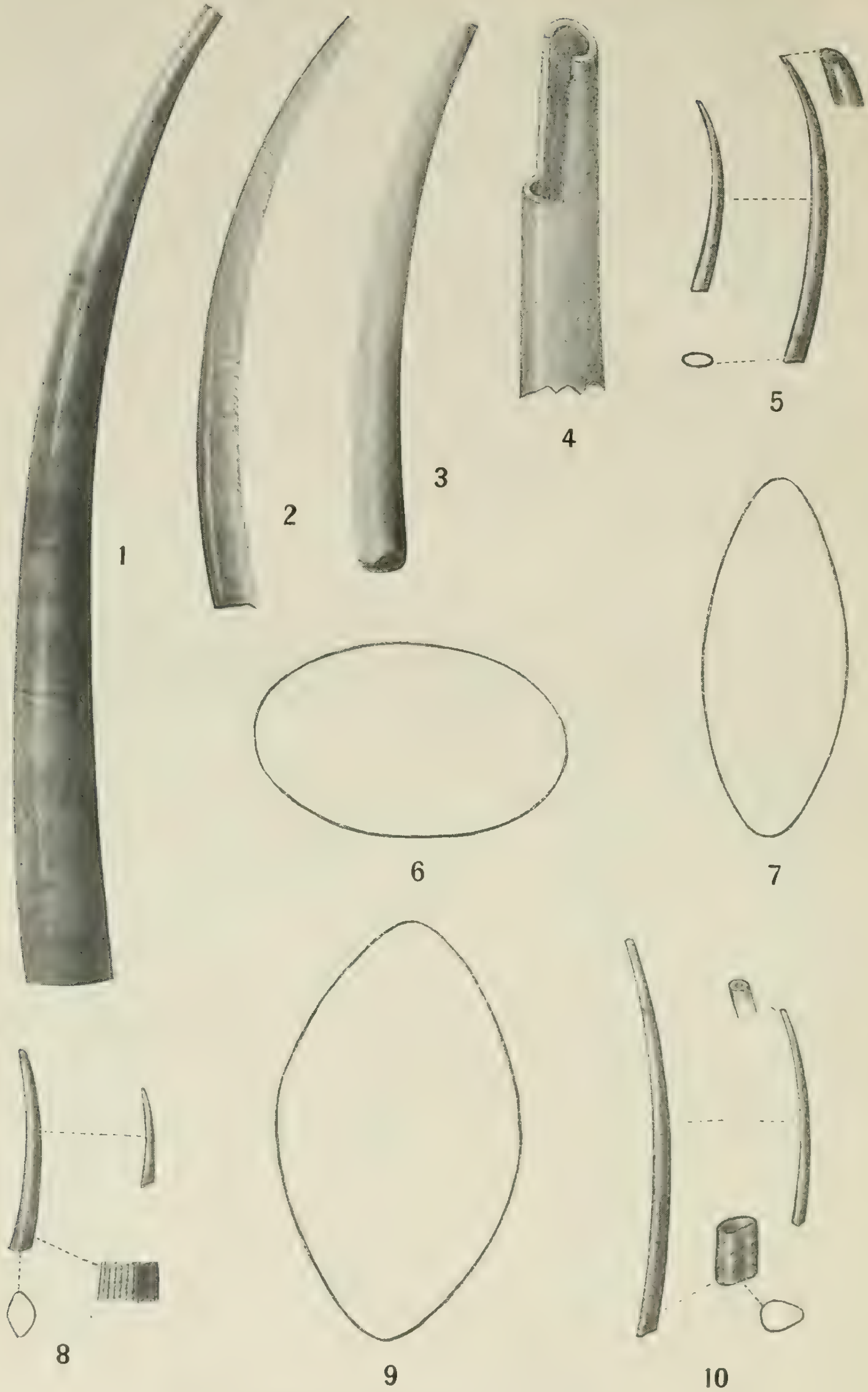

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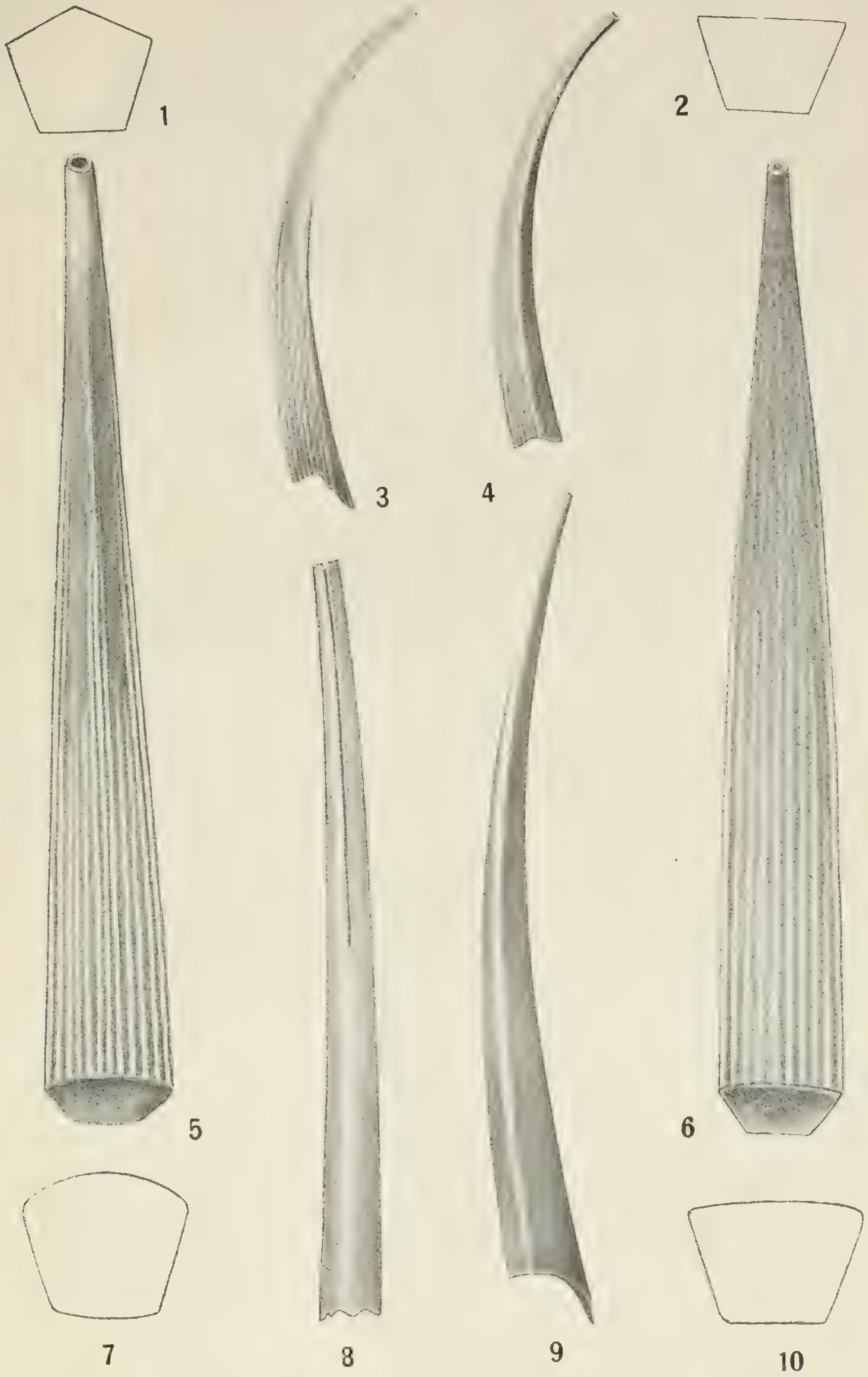

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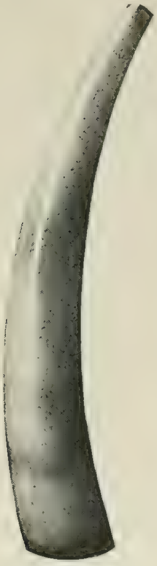
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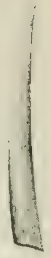
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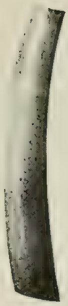
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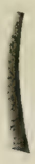
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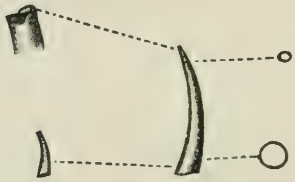
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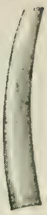
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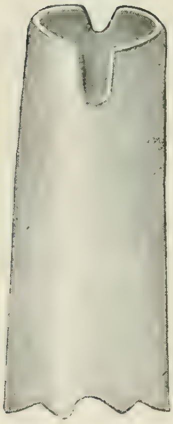
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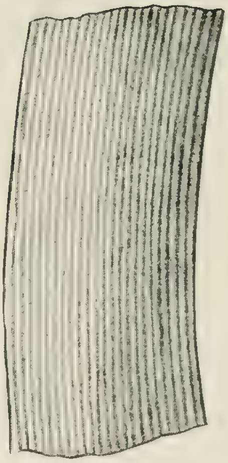
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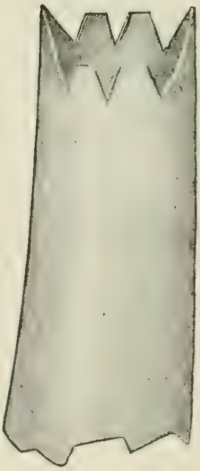
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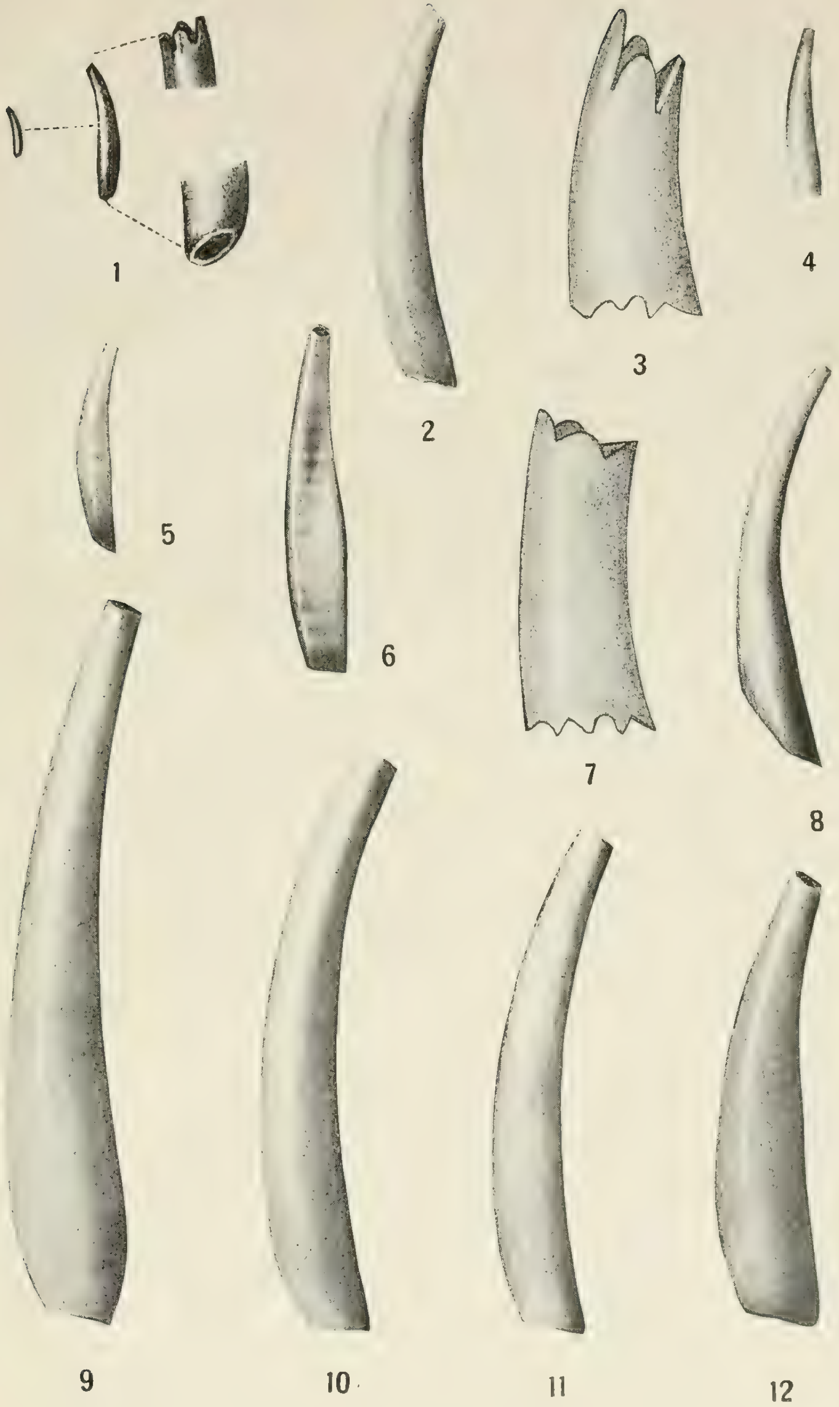

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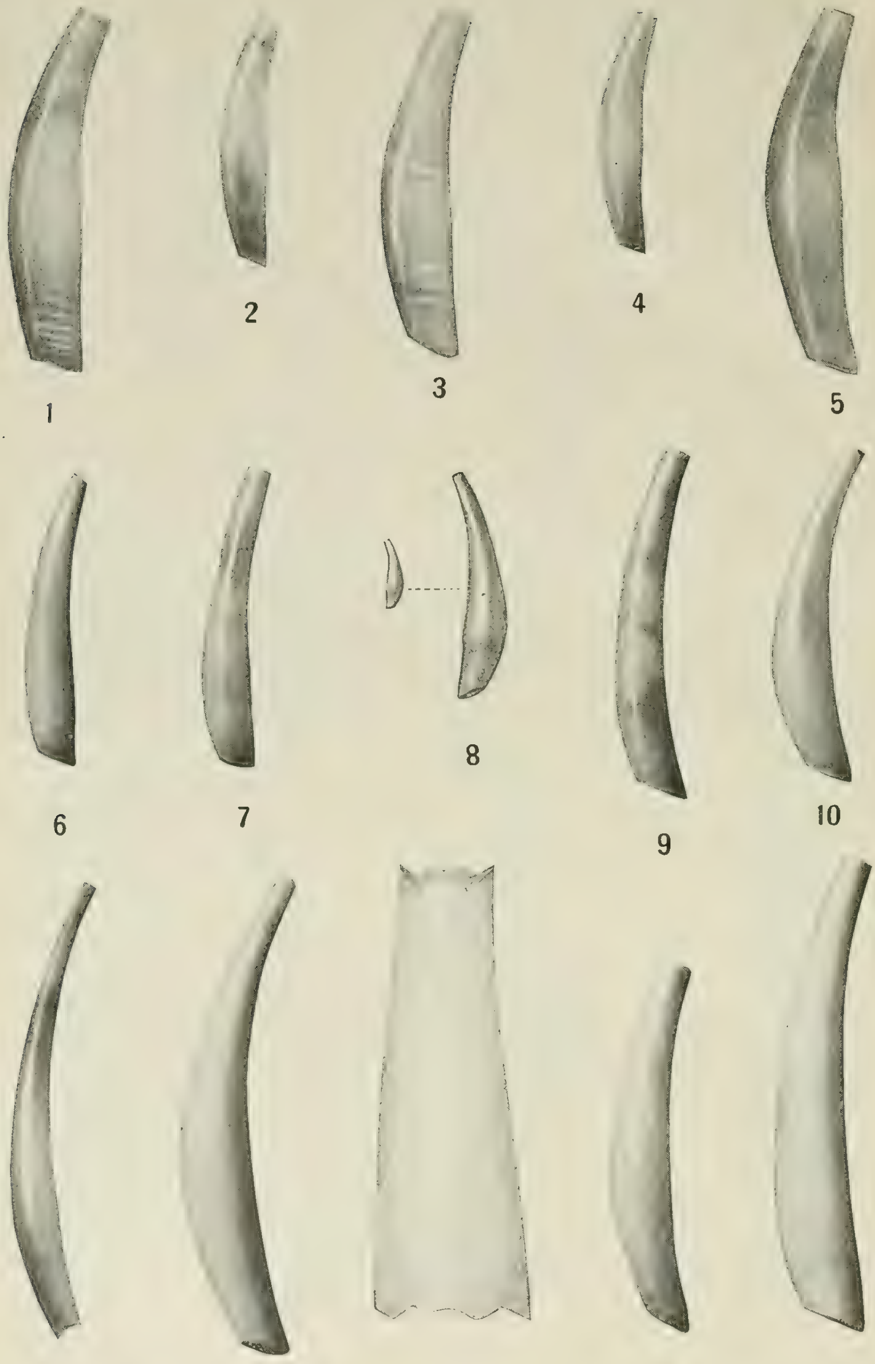

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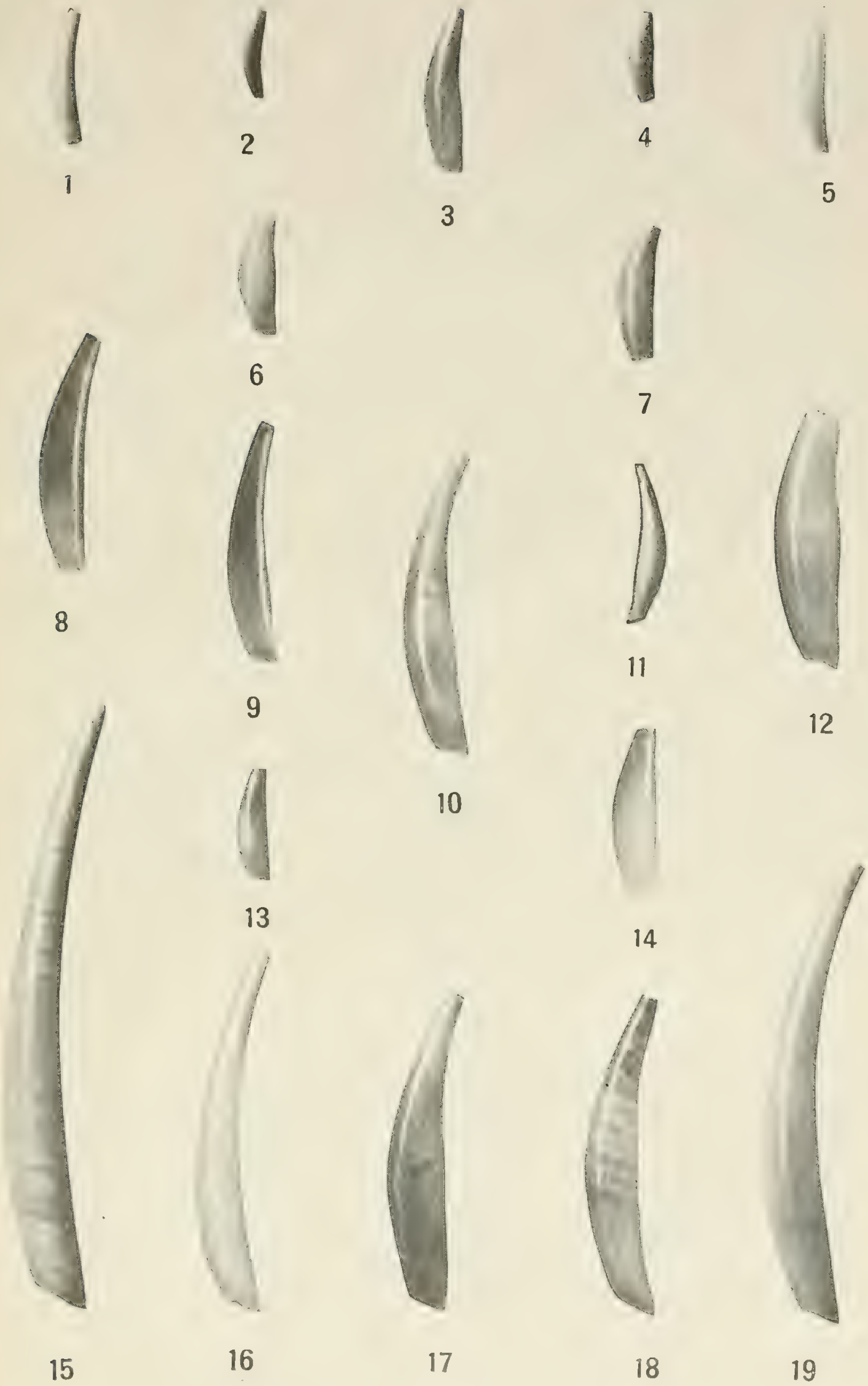

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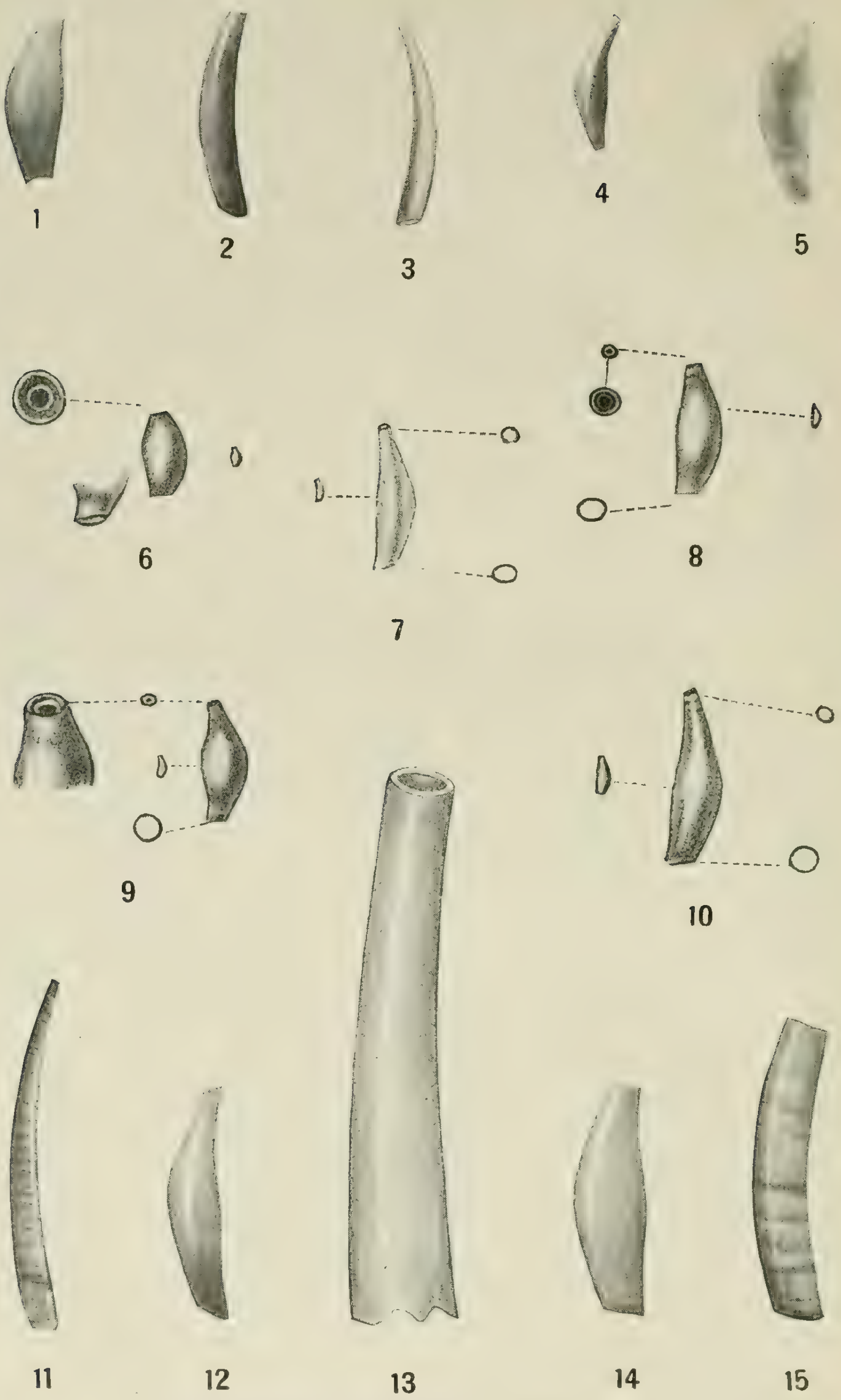

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